Gas Journal

VOL. 293. 110th YEAR. LONDON, FEBRUARY 26, 1958. No 4937 PRICE 1/6

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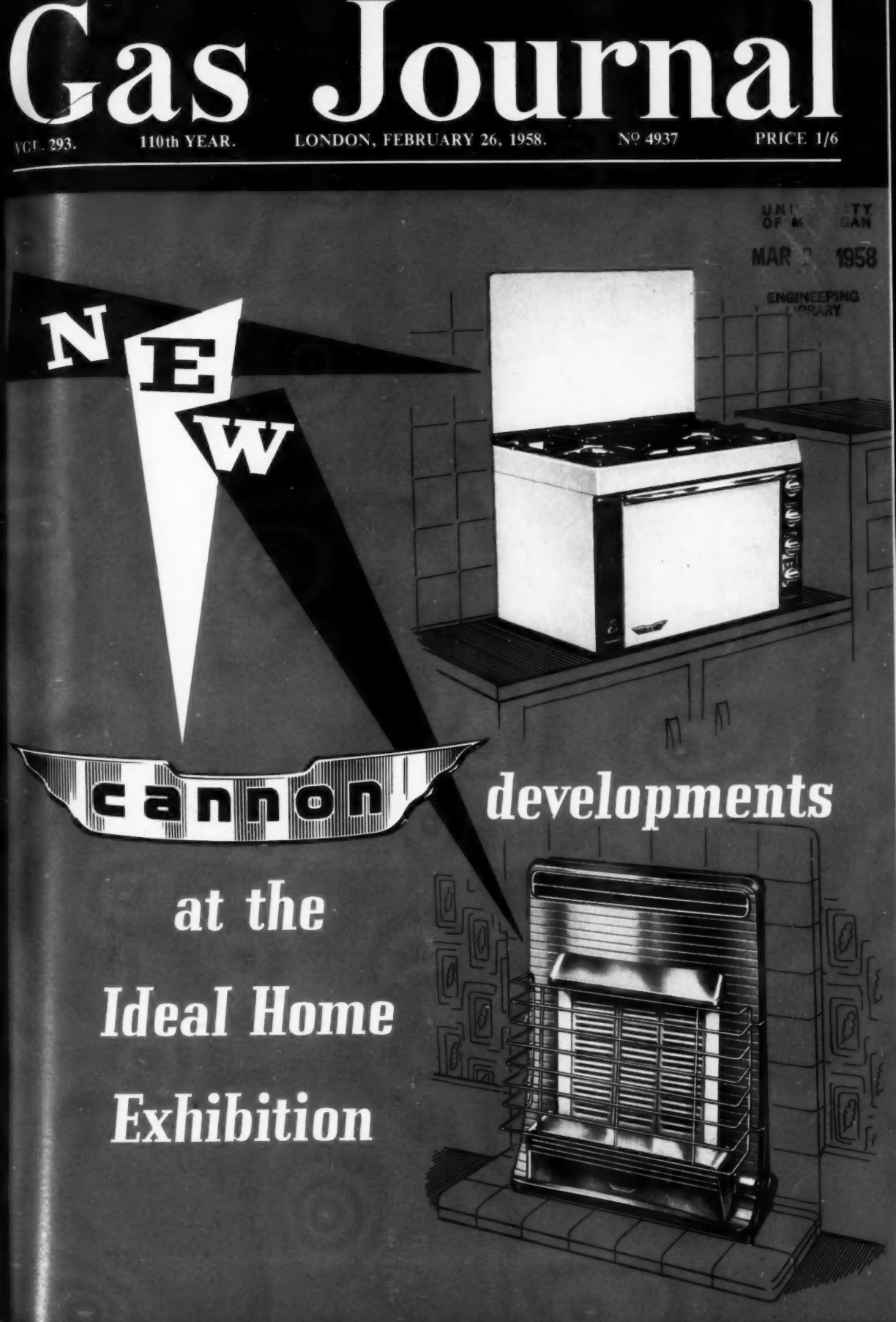

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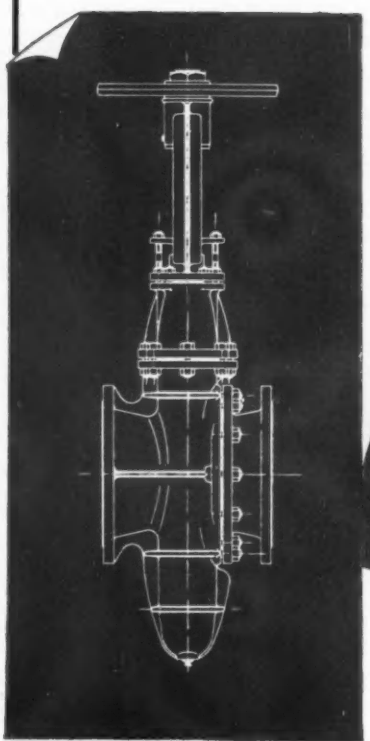

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Gas Journal

VOL. 293 NO. 4937 February 26, 1958

110TH YEAR

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something in common

They remind one of different worlds, the antique chair of 1680-1700 and the modern T.G. meter. Yet they *have* something in common — both are the products of true craftsmanship. The chair, in the style popularly known as 'William and Mary', is attributed to Daniel Marot who designed much of the furniture for Hampton Court Palace. It is presented here as a fine example of furniture design of that period and a worthy sample of the chairmakers' art. The T.G. meter epitomizes craftsmanship and T.G. 'G' prepayment mechanism is accepted as the most modern precision movement on the market.

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Gas Journal

VOLUME 293. No 4937. FEBRUARY 26, 1958. 110th YEAR

A Good Dose of Physic

IT is becoming increasingly obvious that the methods now employed by the gas industry to sell its appliances are unlikely to be sufficient to meet the competition ahead. It is also pretty clear that there is no easy solution. Stern measures are called for and in the following note we would like to draw readers' attention to three ideas which we believe to be worthy of investigation. They will all be unpopular with one section of the industry or another but, with respect, we suggest that the best medicine is often the least palatable.

The first point concerns appliance prices. The fact is that they tend to be too high. There are several reasons for this, some of them, such as purchase tax, being beyond the powers of the industry to remedy by itself. But one very important cause of high prices is the unnecessarily wide variety of appliances in production. A glance at the Gas Council's list of approved appliances reveals a fantastic duplication, and this does not include several recent additions. When one manufacturer has available nearly 20 appliances in one category it is difficult to believe that production costs are as low as would seem consistent with sound marketing. Of course, it is the consumer who is the final arbiter, and if it can be shown that gas users like and need this variety, then there is no more to be said. The truth is, however, that far from wanting such a fabulous choice, the consumer is hopelessly bewildered. The remedy is to prune the approved list, but let us at once make it clear that this must not, and need not, cause hardship to certain of the smaller manufacturers who already have considerable difficulty in 'breaking into' the lists of certain area boards. To follow any course which militates against a fair distribution of orders can only result in weakening the industry as a whole.

In recent years there has been a definite trend towards the sale of cookers in the £40 and over price bracket. Experience has shown that makers who have sought this market have been wise; there are excellent reasons for believing that this type of appliance is a good investment for the industry and the consumer alike. But there will always be a demand for really cheap cookers and in our view it will be necessary for the industry to ensure that they have available a limited list of cookers so cheap that they completely undercut their electrical counterparts. At least one manufacturer has already shown that provided production is concentrated on such a model it is possible to produce a very inexpensive cooker which still retains a high standard of quality and appeal.

The benefits achieved by pruning the number of lines made should, where possible, be utilised for subsidising those markets which are suffering from undeserved adversities. Such a market is the gas fire market which it is extremely important to preserve and extend. Mr. A. F. Oatley pointed out in his recently published statement that credit restrictions and purchase tax barely, if at all, affect the sale of electrical heating appliances, as their production cost is so very much lower than that of the cheapest convector gas fire. Because of this the total purchase price to the consumer is no more, and in most cases less, than the initial hire-purchase deposit on a gas fire.

However, we do not believe that the poor sales of gas fires can be attributed to high initial cost alone. Much more significant is the consumer's fear of a high running cost. Why do oil convectors sell so well? Because they are cheap to buy? To a certain extent, yes. Because they are cheap to run? To a certain extent, yes again, but they are not a lot cheaper than gas. Why

then do they sell by the hundred thousand and gas fires only by the hundred? The main reason, we suggest, is fear of the unknown—in other words, the gas bill. The householder is terrified that having invested in a fairly expensive appliance, she may be letting herself in for an astronomical gas bill. With paraffin, on the other hand, she pays as she goes. Now then, why can't we enable her to pay as she goes, not with a clumsy prepayment meter which the consumer may consider a social disadvantage, to say the least, but with a small simple, not-too-accurate check meter? If we could have a shilling coin attachment not much larger than an appliance governor it would lead to thousands of pay-as-you-go consumers. Already we can hear the rumble of doubt and disapproval from Watson House and elsewhere. But we remember what they said about the gas cooker pre-set timer! If we want to solve the problem of increasing consumption per consumer we must do some original thinking.

To be economic such a meter would have to be made in large numbers but, after all, appliance governors are fitted almost as standard today, and in spite of the number of types available they are not too costly. The sort of meter we have in mind would not be subject to local authorities' testing station regulations and so slight plus/minus errors would not matter. We have no doubt that we shall be told that it just cannot be done. Frankly, we do not believe it.

And so to our last suggestion—not a very original one this time but one which we believe to be timely and important. It is that the cry of 'Sulphur must go' must again be heard in the land. Perhaps we could suggest a new battle cry: Instead of 'Profits are made in the retort house,' why not 'Profits are destroyed in the retort house'? The sale of gas-fired flueless heaters of all types is being knocked for six by paraffin and electricity. If only a modest proportion of those sales had gone to gas portables, we should be in a much more comfortable position today. We have been trembling on the brink of selling clean gas, even at the expense of raising the price, for years. Why don't we take the plunge? The results could hardly be worse than the maintenance worries and loss of business from which we suffer at present.

Reaction to the 'Co-operation' Committee

ON February 12 we reported the Minister of Power's decision to set up a committee to consider co-operation between gas and electricity boards. One might reasonably assume that this was done in deference to a substantial body of opinion in the country and that the announcement would have been hailed with delight by Press and public alike. In fact the response—what there was of it—took a very different course. Most newspapers commented on the Minister's decision but few expressed any enthusiasm. On the contrary, there was some sharp criticism—as in the *Sunday Dispatch* for example, which described the reasoning behind the formation of the committee as 'dangerous nonsense.' The editorial continued: 'Would we get better television if the B.B.C. and I.T.V. worked together? If road and rail services decided to combine, would we get more efficient transport? Above all, would we get either TV or transport more cheaply? Lord Mills should know by now that any organisation goes soft when it has nothing to fight—nobody with whom to compete. It is, moreover, sheer nonsense to assume that either the gas or electricity boards can maintain even their present service—which often leaves much to be desired—if they stop selling. Once we get one showroom for both services—once the salesman ceases to care whether he sells gas or electricity appliances—service will fall off.'

On the radio opinion followed similar, albeit less sharply defined, lines. Listeners to the B.B.C.'s 'At Home and Abroad' heard Mr. George Wansbrough, who was 'connected with electricity supply in North Wales before nationalisation,' discussing the Government enquiry into co-operation between gas and electricity. On the possibility of joint billing and collection of accounts, he pointed out that the two industries spent £17 mill. a year between them on this item. Even a saving of one-tenth of that would be justified. Emphasising the need for continued competition, Mr. Wansbrough said that though it was easy to talk of waste in advertising and showrooms; 'the committee may well find ways of reducing costs without either reducing competition or lessening the customer's chance of knowing what is available.' The 'Any Questions' team also made it clear that they regarded competition as a spur to efficiency and a means by which the consumer could be safeguarded.

A fair barometer of public opinion is provided by the correspondence columns in the national Press—provided of course that one takes a fair cross-section of the papers. Here again there was a conspicuous lack of enthusiasm concerning the investigation. That indefatigable letter writer, Mr. R. E. Gamlen, writing in the *Financial Times*, made the significant observation that the sum spent on advertising by the electricity supply industry in the year ending March 31, 1957, amounted to something like 0.0012d. per unit sold, an amount too small to affect tariffs at all. The average price per unit sold was 1.481d. and the cost of advertising was 0.08% of this, or 8-100ths of 1%. A very small proportion when compared with amounts up to 10% of the turnover spent by many trading concerns. But if there were to be no advertising the sale of units would decrease and this would increase the cost per unit because the overhead costs of supply would have to be spread over fewer units. Thus in order to avoid loss it would be necessary to increase the price per unit to consumers. It would be seen that advertising was a cheap and convenient method of helping to keep down the price of electricity.

However, Mr. Gamlen was not allowed to get away with that without a protest. A subsequent letter from a Mr. D. Ogilvy remarked that Mr. Gamlen had based his calculations on expenditure by the Central Electricity Authority and had not included the sum spent by the area electricity boards.

Meanwhile, in the House of Commons, Mr. A. Palmer (Labour Member for Cleveland) has pressed for a consumers' representative on the Committee and Mr. A. Robens (Labour, Blythe) has asked that the trade unions concerned should be represented also. The Parliamentary Secretary's reply was to the effect

that this was primarily a commercial matter, a question of how far in their activities, if at all, the two fuel industries could save money by eliminating useless competition; therefore he did not think it necessarily desirable that, every conceivable interest should be represented. Asked by Mr. Robens whether that meant that matters like joint meter readers and joint accountancy were not to be considered by this committee, only purely commercial matters such as contracts, buying and things of that kind, Sir I. Horabin gave a reassurance that such matters, which were a part of the commercial running of these industries, would certainly be relevant.

Mr. Nabarro's New Bill

WE went to the House of Commons last week to hear Mr. Gerald Nabarro, M.P., explain his Thermal Insulation (Dwellings) Bill which has seven Tory and five Socialist backers, and is due for a Second Reading on February 28. Its theme is 'Warmth Without Waste,' and its purpose is to ensure increased efficiency in the use of all fuels for home heating and improved comfort standards. Within the context of fuel efficiency and conservation, this measure is designed to complete a trinity of legislative instruments, the first two of which are the Clean Air Act, 1956, and the Thermal Insulation (Industrial Buildings) Act, 1957.

The Bill provides that the Minister of Power may prescribe by regulations to be laid before both Houses of Parliament, minimum standards of thermal insulation to prevent avoidable heat loss in new dwellings but *not* those commenced before January 1, 1960, or such earlier date as the Minister may appoint. Thus, the measure does *not* apply to existing dwellings. Local authorities in England, Scotland and Wales would be the enforcement agencies for the Minister, and there is the right of appeal to the Minister in the event of dispute. There are appropriate provisions for enforcement and various supplementary requirements, including an exemption provision where deemed desirable by the Minister in respect of classes of dwellings, or by the local authority in the instance of a particular dwelling.

According to Mr. Nabarro, whichever political party forms the Government during the next couple of decades, it is fairly certain we will build a quarter of a million new dwellings annually. In the interests of fuel conservation it is obviously desirable to avoid heat losses in these houses. Since each dwelling in the United Kingdom uses about five tons of coal or coal equivalent annually, four tons of which are used for space heating, a saving of 25% which is possible in a properly insulated house would produce, in new property, a saving of 250,000 tons of coal by 1960 and no less than 5 mill. tons by 1979—worth £40 mill. per annum at today's costs.

Mr. Nabarro maintains that as a national average a new dwelling, say a council house containing four bedrooms and the other usual accommodation, would cost £8 for thermal insulation, where such a dwelling costs £1,600, newly erected; half of 1% of the capital cost of the dwelling in respect of thermal insulation is his figure—say 1¼d. in the £ of capital cost of the dwelling house. Now this appears to us to be extraordinarily low, and it would be interesting to know on whose figures Mr. Nabarro bases his calculations. However, it may be said that if insulation devices are built into the structure of a dwelling during erection, the finished cost would be very little higher than an uninsulated building. Also it is probably fair to assume that the implementing of regulations of this kind would encourage some owners of existing property to indulge in thermal insulation of their own free will.

There is in existence today a model by-law issued by the Minister of Housing and Local Government and embraced by the majority of local authorities, covering thermal insulation of new dwellings. But by universal consent, the standards referred to in the model by-law are so pitifully low as to have no real effect upon fuel economy or comfort standards. In any event, the model by-law is optional, and to achieve the big advantages which thermal insulation may yield, Mr. Nabarro believes it should be made obligatory for much improved standards of thermal insulation to be applied to all new dwelling houses.

We anticipate that the Bill will have a difficult passage, much more so than that relating to industrial buildings, because it is infinitely harder to enforce. Much depends on the results of the Government's consultations with local authority associations and on the establishment of minimum standards. In a burst of frankness Mr. Nabarro said he thought it was two to one against getting it through. We doubt if the odds are much better than that, but the Bill certainly has our sympathy and support. Why? Because it seeks a situation in which there would be an infinitely stronger case for space heating by a refined fuel such as gas.

Gasology and the Children's Comic

ON more than one occasion we have stressed the importance of publicising gas to young people, and it is therefore with some enthusiasm that we report a new Gas Council project which aims at bringing home the advantages of gas to all age-groups from seven years to the late teens. It is claimed to be the biggest educational project ever aimed at the youth of Britain by one industry, and will be launched in April through the medium of the leading children's papers *Girl*, *Eagle* and *Swift*. The main target will be girls aged from ten to 16, the housewives of tomorrow. Realising that gone are the days when mothers virtually chained their daughters to the cooker—with a view to preparing them for matrimony—the Gas Council is setting out to bridge the gap by portraying in serialised cartoon form the cookery adventures of Con and Chris who will try their hand at a brand-new recipe every week. Hints on the correct use and care of cooking appliances and domestic utensils will also be given.

A new word, 'Gasology,' has been coined for the new armchair science feature for boys depicting every facet of the gas industry, from gas making to its innumerable uses in industry and the variety of by-products. For the younger children, there will be elementary science with the history of heat, hot water and cooking told in pictorial form.

We think this is a first-rate idea. Apart from the advantages already mentioned, it ties in beautifully with such events as 'Youth, in the Kitchen.' Times have changed. Our twopenny 'bloods' were never like this!

Personal

MR. EWART BERNARD TROTMAN, Divisional Rental superintendent in the consumers' accounts office of the West Midlands Gas Board at Darlington Street, Wolverhampton, is to take a three-year course at King's College, London, where he will read law, having been given a scholarship by the Board. Mr. Ernest Edward Collins, Technical Assistant at the Board's Malvern works, who has also been given a scholarship, will study chemical engineering for three years at Birmingham University. Mr. Trotman, who is 34, and Mr. Collins, who is 31, will start their respective courses in the autumn. They will receive full salary during their three years' course and may be called on to work for half of the summer vacation. Mr. Trotman entered the gas industry in 1948 as Chief Clerk of the Halesowen Gas Company. In 1950, at the age of 26, he was promoted senior internal Audit Assistant in the Wolverhampton and District Division of the West Midlands Gas Board. He was appointed to his present position in 1952. Mr. Collins started his career in the gas industry in the laboratory at Norwich gasworks, and after a long illness when he was 21, joined the West Midlands Gas Board in 1954 as Technical Assistant at Malvern. He qualified as an Associate Member of the Institution of Gas Engineers in 1956 and took the Board's prize for the best student of the year.

Mr. E. B. Trotman.

Mr. E. E. Collins.

Mr. Stanley G. Deavin, Secretary of the North Western Gas Board, shows his decoration to his wife and their 18-year-old son, John, outside Buckingham Palace, after his investiture with the O.B.E. recently.

MR. ROBERT STURROCK has retired after 40 years' service in the gas industry, 34 years of which were spent in Ardrossan, where he was District Manager of the Scottish Gas Board. He is succeeded by MR. IAN SIMPSON, who was District Manager at Darvel and Newmilns. Mr. Sturrock was a former President of the North British Association of Gas Managers, and for eight years was Secretary and Treasurer of the Association. In addition to being District Manager at Ardrossan, he was Lighting Inspector for the burgh, a post from which he retired in October of last year. Before going to Ardrossan in 1924 as Manager of the Town Council's gasworks—a post which became that of District Manager when the industry was nationalised in 1949—Mr. Sturrock was Chief Chemist and Assistant Manager of the Dalmarnock works of Glasgow Corporation Gas Department for nearly seven years. To mark his retirement he has received presentations from the Ardrossan District employees and from the district managers of the former Western Group.

MR. ALLAN H. EDNEY, Group Advertising Manager, Ascot Gas Water Heaters, Ltd., has received a Fellowship of the Incorporated Advertising Managers' Association, in recognition of his services to advertising generally, and advertising management in particular. In his second year of Office as Chairman of the Society of Members of the Advertising Association (M.A.A.), Mr. Edney also serves on the Council and Executive Committee of the Advertising Association; is a Council Member and Education Officer of the Publicity Club of London, and a Member of the Export Advertising Committee of the Incorporated Society of British Advertisers, Ltd., for which organisation he is also his Company's representative.

Mr. A. H. Edney.

Diary of Forthcoming Events

February 27.—NORTH THAMES G.C.C.: Westminster City Hall, London, W.C.2.

February 27.—INSTITUTE OF FUEL (EAST MIDLAND SECTION): Gas Showrooms, Nottingham. 'Recent Developments in the Synthesis of Oil from Coal,' by Dr. C. C. Hall. 6.15 p.m.

February 27.—INSTITUTE OF FUEL (SCOTTISH SECTION): Royal College of Science and Technology, Glasgow. 'Use and Availability of Gas Coke as a Smokeless Fuel in Scotland,' by S. Smith. 7 p.m.

March 4.—SOUTH EASTERN G.C.C.: Caxton Hall, S.W.1. Committee Meeting. 11 a.m.

March 4.—MIDLAND JUNIORS. 'Electrical Economy in Gasworks,' by T. Bryan.

March 5.—SCOTTISH G.C.C.: 26, Drumsheugh Gardens, Edinburgh. 11.30 a.m.

March 5.—SOUTHERN G.C.C.: Civic Centre, Southampton. 11.00 a.m.

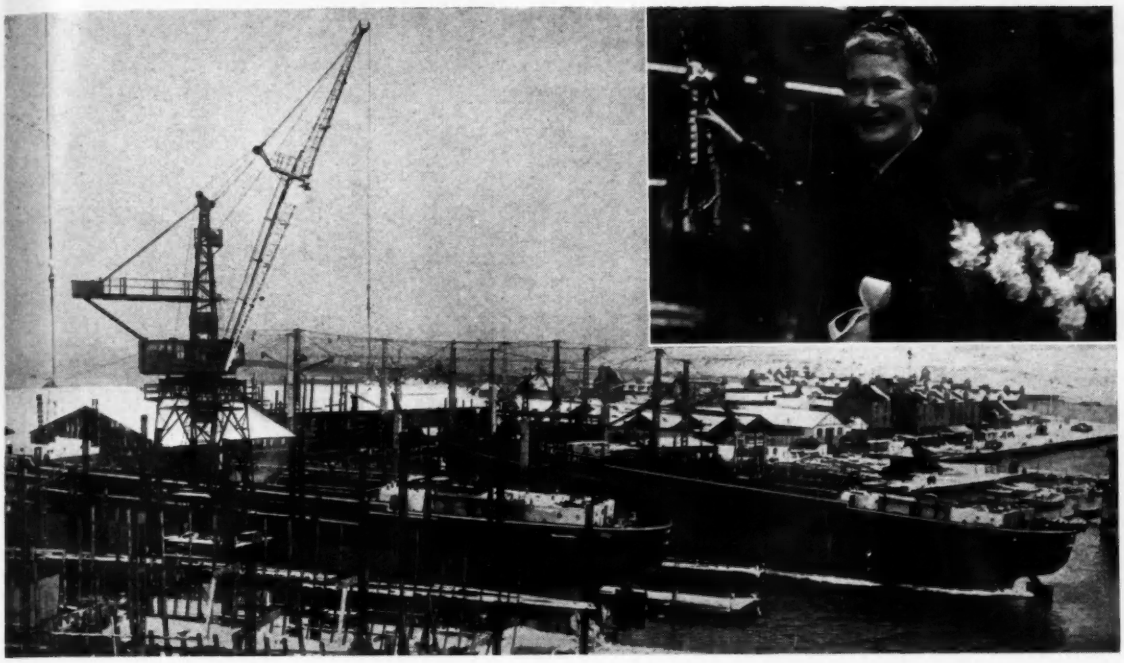
March 6.—NORTH OF ENGLAND SECTION I.G.E.: Market Street, Newcastle on Tyne. 'Introspection by Technical Audit,' by J. E. McManus. 2.30 p.m.

March 8.—SCOTTISH WESTERN JUNIORS: Joint Meeting with Eastern Section, 9, George Square, Glasgow. Address by D. D. Melvin. 3.00 p.m.

March 11.—INSTITUTE OF FUEL (MIDLAND SECTION): M.E.B. Lecture Hall, Stoke-on-Trent. 'Recent Developments in Gas for Ceramic Firing,' by L. Walker and K. Davis. Joint meeting with the N. Staffs. Fuel Society. 7 p.m.

March 12.—INSTITUTE OF FUEL (N. WESTERN SECTION): Albert Square, Manchester. 'Application of the B.P. Corrosion Control Process in Industry,' by Dr. G. Whittingham and L. K. Rendall. 2.30 p.m.

TWO MORE S.E.G.B. SHIPS GO DOWN THE WAYS



The snow-covered scene at Aberdeen as the South Eastern Gas Board's new collier, m.v. Ewell, is launched from the yard of Alexander Hall & Co. Inset, Dame Alix Meynell, D.B.E., is seen performing the naming ceremony.

STEAMERS GIVE PLACE TO MOTOR VESSELS

THE South Eastern Gas Board are continuing to replace a number of the older steam-driven ships of their collier fleet, which are nearing the end of their useful and economical life, with motor ships of modern design. One new 2,800 ton 'up-river' collier, the m.v. Dulwich, is already in commission, as well as the new 4,000 ton m.v. Southwark.

The Board's policy came one step nearer to fulfilment recently with the launching at Aberdeen of two more 2,800 ton vessels, the m.v. Ewell and the m.v. Lambeth. The shipbuilding programme will be completed when the fourth ship in this 'up-river' class, to be named Camberwell, is launched next September.

The naming ceremony for the m.v. Ewell was performed at the yards of Alexander Hall & Co. last month, by Dame Alix Meynell, D.B.E., Chairman of the South Eastern Gas Consultative Council and Member of the Board. She was accompanied by her husband, Sir Francis Meynell. The Ewell will be commissioned by Captain H. M. Chaston.

The double launching was completed on the following day at the adjacent yard of Hall Russell & Co., Ltd., when Mrs. C. Stott, wife of the Board's Deputy Chief Engineer, christened the m.v. Lambeth. The Master of the vessel will be Captain N. Carr.

Like the Ewell, the Lambeth is an 'up-river' ship, and can discharge at any of the Board's Thames jetties—East Greenwich, Rotherhithe, or Wandsworth. The vessels are expected to be in service by April.

Tribute was paid by Mr. W. K. Hutchison, C.B.E., Chairman of the Board, to all those who built and manned the Board's ships. He emphasised that the modern collier was the most efficient method of bringing coal from the North-East Coast ports.

Telegrams of good wishes were sent by Councillor A. W. Gardner, Mayor of Epsom and Ewell, and Councillor George Brownless, Mayor of Lambeth. The spirit of both launchings is, perhaps, well expressed in the lines read by Dame Alix Meynell from a poem by her husband's mother, Alice Meynell:

> 'Now to the laws of ocean we
> Builders on earth by laws of land,
> Entrust this creature of our hand
> Upon the calculated sea.'

No, You Pay!

The Northern Gas Board are asking Gateshead Corporation to pay half the cost of removing gas street lamps which have become redundant as a result of slum clearance schemes. It is understood, however, that under an Act of Parliament passed 60 years ago, the Corporation insists on the Board removing the lamps free. The Board state that this Act is now out-of-date and unrealistic, and the question of promoting a Bill to amend it is being considered.

H. & G. Associates Build New Paris Gas Plant

THE French associates of Humphreys & Glasgow, Ltd., Gaz à l'Eau et Gaz Industriel, have completed a new plant for Gaz de France at Landy works, Paris, to reform liquid petroleum gas, or refinery or natural gas. It is primarily intended to meet peak load conditions.

This unit, employing the Onia autothermic catalytic process, is producing 10 mill. cu.ft. of reformed gas per day from a feedstock of commercial butane. The reformed gas has a calorific value of 180 B.Th.U. per cu.ft., and a specific gravity of 0.68; it can, if necessary, be subsequently enriched by the addition of butane.

The plant is operating at an efficiency in excess of 90% and is self-supporting in steam.

War-time Surcharge

A war-time surcharge of 4% still charged on gas cookers and parts delivered from England to all parts of Ireland except Belfast and Dublin was recently discussed at a meeting of Bangor, Co. Down, Borough Council.

METROPOLITAN GAS METERS MAKE RECORD PROFITS

But Price Competition has Intensified

GROUP trading profit of Metropolitan Gas Meters rose from £37,423 to a record of £42,140 in the year ended September 30, 1957. Since the end of the financial review price competition has been much intensified, however.

It may prove extremely difficult to maintain profitable sales in the home market, says the Chairman, Mr. R. H. Studholme. This possibility has been foreseen, he adds, and the Directors have been developing business in other directions.

Contract work has been considerably increased, the production of infra-red ray gas appliances has made marked progress and a larger turnover has been obtained in meter repair work.

Mr. Studholme, however, thinks it unlikely that the record profit will be repeated in the immediate future.

Group net profit is £14,247 (£13,055) and the dividend, as reported on January 28, is 15% (same). Net current assets total £120,097 (£108,881).

BRITISH OXYGEN CO. AGAIN IMPROVE SALES OF PRODUCTS

SALES volumes of most of the products of the British Oxygen Co., Ltd., again increased during the year to September 30, 1957, at home and overseas. This growth in sales helped to counteract the continued heavy increase in operating expenses at all stages.

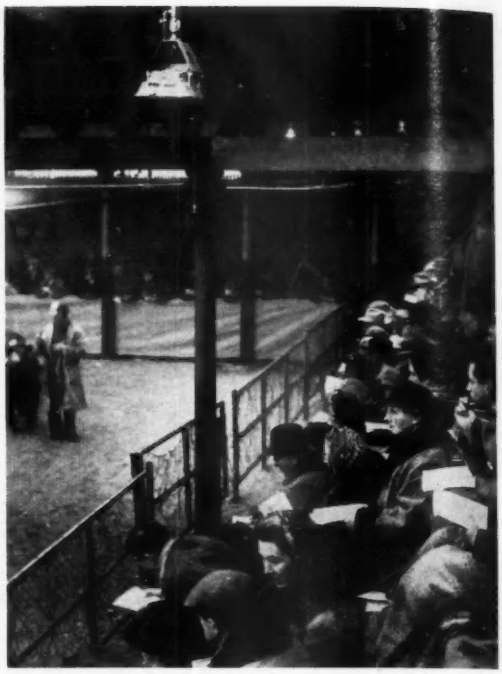
Group trading profit after charging depreciation, £3,217,463 (£2,610,299) was £5,964,085 (£5,198,464) less tax, £3,215,099 (£2,699,611). Unappropriated profit brought forward was £918,379 (£741,637).

Interim ordinary dividend was 4%, absorbing £392,085, while proposed final dividend is 6%, absorbing £588,127 (both same). Unappropriated profit carried forward is £1,060,737.

First Lecture

'The Influence of Welding on Structural Design,' by Professor Sir Alfred Pugsley, is the first of a series of annual lectures to be given by eminent scientists and engineers devoted to subjects of wide general interest. In this first lecture, Sir Alfred, who is Professor of Civil Engineering at Bristol University, will discuss how the advent of welding has demanded a change in the outlook of engineers and how its application must influence design.

Time was when the Perth's Bog February pedigree bull shows were held in the open air, in the street, but as February's weather is not the best for comfort, for a number of years now, the show has been held indoors in a huge ring. This year, with the co-operation of the Perth Group of the Scottish Gas Board, the seating accommodation has been heated with a number of Parkinson & Cowan 'Swank' infra-red heaters, suspended from the roof, one of which is pictured here.



New Zealand Installs First Oil Gas Plant at Hastings

A NEW plant to make town gas from residual fuel oil has just been completed at Hastings, New Zealand. It was built for the Hastings Gas Co., Ltd., by Humphreys & Glasgow, Ltd., using the Onia-Gegi catalytic process, and will make Hastings one of the first cities in the Southern Hemisphere to distribute gas manufactured exclusively from fuel oil.

A million miles without an accident is the record of 60-year-old Mr. J. (Joe) Jarvis, who has been awarded the National Safety First Association's award for 31 years' safe driving. Joe, for the past six years chauffeur to Sir Henry Jones, Deputy Chairman of the Gas Council, has spent 43 years in the gas industry. Today, he drives a Bentley, a far cry from the solid-tyred coke lorries he used to drive for the Gas Light and Coke Company before the first world war.

Delegates to the annual conference of the Gas Institute of New Zealand visited the plant on February 19. Completely automatic, this plant—which has a capacity of 300,000 cu.ft. per day—can be operated if necessary with only one operator at a time in attendance.

The installation is regarded as a most important development for the gas-making industry in New Zealand, because of the big savings in manufacturng costs which the process offers in isolated works and places where coal is expensive. Other points which have a special appeal in the Dominion are the cleanliness of the process and the absence of need for manual handling of fuel. The Hastings gasworks previously used an old horizontal retort plant, which was failing to give the quantity and quality of gas required for domestic and industrial purposes.

Decision to install the new plant was made by the Directors of the Hastings Gas Co., Ltd., after very full inquiry and reports as to the type of gas plant most suitable for Hastings' requirements. The contract was carried out through Humphreys & Glasgow's office in Sydney, Australia.

Hastings, in New Zealand's North Island, has a population of 24,000, and is the centre of a farming and fruit-growing district.

: TRANSATLANTIC CABLE :: TRANSATLANTIC CABLE :: TRANSATLANTIC CABLE :

: FROM HILDING CARLSON :

New York, February 13.

Consumers, Sales, Revenues all Increased in 1957

WITH the end of one year and the beginning of another, there are the inevitable reviews and expressions of confidence and progress in the American gas industry. Consumers, gas sales, and revenues all increased during the year, with the biggest upward swing in the industrial field.

With gas replacing petroleum as the house heating fuel, the undertakings' customers in that category now aggregate 18 mill., including an 8% increase over 1956. The total should approximate 20.5 mill. at the close of 1959. Currently, 36% of the 50 mill. occupied dwelling units in the U.S. are gas heated. And 63% of all residential customers use gas for house heating.

The underground storage pools, principally in the Middle Atlantic and East North Central states, now have an ultimate capacity of more than 3.4 bill. cu.ft. These storage pools make it possible for transmission pipelines to operate at higher annual load factors and give higher public assurance of adequate and continuing gas service in the high-demand areas that are remote from the gas producing fields.

U.S. Bureau of Mines estimates the ultimate recoverable gas reserves at 1,000 bill. cu.ft. That is widely regarded as conservative.

Approximately 5,000 new or improved appliances and equipment items were received at the American Gas Association laboratories in Cleveland and Los Angeles last year for testing. AGA approvals are necessary to use the 'Blue Star Approval Seal' that is widely accepted by consumers as the authoritative indication of safety, durability, and performance.

The American gas industry has given a firm adoption to the television programme, 'Playhouse 90.' Estimates of the audiences that hear the weekly messages and demonstrations of gas appliances range from 11 to 14 mill. homes. 'Playhouse 90,' so called because it is a 90-minute programme, has received numerous awards for its quality of dramatic presentations. Rated consistently as one of the top ten national television network programmes, it appears on 127 coast-to-coast stations simultaneously. For 1958, gas industry subscriptions to support 'Playhouse 90' were increased to more than £1 mill., from the 1957 total of approximately £800,000.

Research programmes advanced in all fields. Some projects now under investigation include air conditioning and domestic incineration; production of natural gas substitutes; improved pipeline design and operation.

Appliances and equipment sold by the manufacturers present a somewhat different summary. The brightest spot in the Gas Appliance Manufacturers' Association's massive statistics is the 'built-in' cooker category. It had 12 months of plus-marks over the 1956 months, that culminated in a 19% increase for the year's sales. Figuratively, the manufacturers' state-of-mind is at the point of saying: 'Fire the salesmen and cancel the advertising contracts!' They go into that state every time—*just when they have their greatest need for salesmen and advertising!*

The American industry now is sure that it has a gas refrigerator.

One of the largest appliance manufacturers, Whirlpool Corporation, has picked up the pieces of the Servel refrigerator. First production under the new management will be on the market by mid-April.

Whirlpool Corporation, itself part of a recent four-way giant merger which included the cooker line produced by Radio Corporation of America, announced immediately that approximately £160,000 has been budgeted for gas refrigerator research during the next year. They already spend approximately £357,000 for research on other appliances.

RCA-Whirlpool produces cookers, laundry dryers, combination washer-dryers, kitchen cabinets, kitchen disposal units, dish washers and sinks. Now, the gas refrigerator has been added. They plan to add automatic storage water heaters to that line of appliances.

As in Great Britain, the basic Swedish gas refrigerator originally was called the Electrolux in America. That was changed, in the course of an earlier financial scramble, to Servel. It seems reasonable to expect that its new name, RCA-Whirlpool, will have greater durability.

A huge market for gas appliances in the U.S. is an old market—home modernisation. The gas industry has looked at it, talked about it, groaned about it, said they really ought to do something about it—oh, they've been huffing and puffing about it for years. But, it wasn't until the public relations counsellors to Gas Appliance Manufacturers' Association put programmed planning to work that the industry had anything that resembled a convincing story.

After all, even though that cooker is 15 years old, it works, so why get a new one? Same question for central heating equipment and water heaters.

The publicity send-out directed at the modernisation market has been heavy

Miss Julia Meade reaches 11 to 14 mill. homes with dignity and conviction as she describes the advantages of her gas appliances. The messages and demonstrations change weekly to give variety and representation for the seven residential uses of gas—cooking, water heating, comfort heating, air conditioning, clothes drying, refrigeration, and incineration.

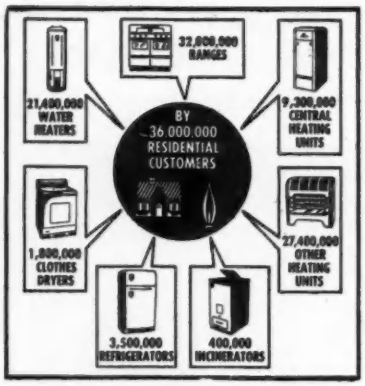


Fig. 1.

and well-planned with commendable substance that gives old-house owners factual considerations. No attempt has been made to count the newspaper and magazine clippings that are accumulating. Reports on the use of recorded publicity by radio stations show additional effective contact with this market.

The market? It has been estimated at £5.4 mill., annually, for building materials and equipment to be used in existing housing.

Construction in 1958, as predicted by the U.S. Departments of Commerce and Labour, will show an 11% increase over 1957 for the overall gas industry. Only the electric industry, with 12%, is expected to have a larger percentage increase. The educated guessing came up with a total of £714.3 mill. for the gas industry. That includes construction related to natural gas production, gathering systems, processing plants, pipeline systems, underground storage fields, undertakings' distribution facilities.

There are 96 mill. gas appliances in use throughout the U.S., according to a recapitulation by American Gas Association last month. The per-family average is just less than three appliances for the 36 mill. gas-using families. The undertakings serve 28 mill. and the remainder uses LP ('bottled') gas. (See Fig. 1.)

An American visitor to the British gas industry last summer, Mr. Jac A. Cushman, of American Gas Association, has been appointed Corporate Secretary and Convention Manager of the Association. He has been assistant Director of public information and, earlier, Editor of the Association's monthly.

The international arrival building at New York international airport (Idlewild) opened in December and expanded the demand for gas at the airport. The current annual revenue for gas is about £59,000; Brooklyn Union Gas Co. estimates this will double in 1958 if contemplated construction is completed. Ultimately, when air conditioning equipment is used to capacity, the annual consumption will be approximately 250 mill. cu.ft. for cooling purposes. The undertaking reports an investment of approximately £285,000 in medium pressure mains and services, from 1½ in. to 16 in. The new arrival building is 2,300 ft. long, with 592,000 sq. ft. of floor space. The airport covers 655 acres.

The 'GAS JOURNAL' correspondent receives great masses of alleged information from the gas industry throughout America and Canada. Envelopes from hundreds of sources have nothing unusual about them. Last month, an official post office rubber-stamping on one *did* warrant a second look: 'Missent to Gasport, N.Y.'

Gas for house heating in the U.S. has resisted the upward trend in the cost-of-living, American Gas Association showed in a summary chart released last month. (See Fig. 2.) While 'all items' in the consumers' price index moved up 28.4 points in the 1950-57 period, gas for home heating distributed by the undertakings showed 18.4 points. Anthracite, bituminous coal and fuel oil exceeded the average for all items combined.

Gas undertakings in America are commercial sponsors for a number of radio and television programmes, with some emphasis on news and weather features.

United Fuel Gas Co., with service areas in Kentucky and West Virginia, has a 'Scan the Weather' programme nightly on three television stations. In addition to reviewing the day's weather and predictions for the days ahead, viewers are learning how to measure cold. The unit, of course, is the 'degree-day' that has been adopted by the American industry as the basis for temperature comparisons, time-to-time and place-to-place.

Well—here we go again! The American industry has another 'case.' This one is called 'The Memphis Case.' It's a good one, as usual. It rates extensive newspaper space. The cast of characters includes the President of the United States, the U.S. Supreme Court, a lower U.S. court, the Federal Power Commission, a pipeline company, an undertaking. In addition, it seems that most of the rest of the industry is trying to crowd on the stage. The crying and wailing is heart-breaking! With a U.S. Supreme Court decision expected soon, we shall summarise all the noise in these columns next month.

CANADA

National Gas Reserves 'Unlimited'

Natural gas reserves in Western Canada are virtually 'unlimited,' Mr. Frank M. McMahon, President of Westcoast Transmission Co., Ltd., asserted during the Company's annual meeting, late last month.

'The discovery rate in Alberta and British Columbia has been so great in recent years that gas reserves have long

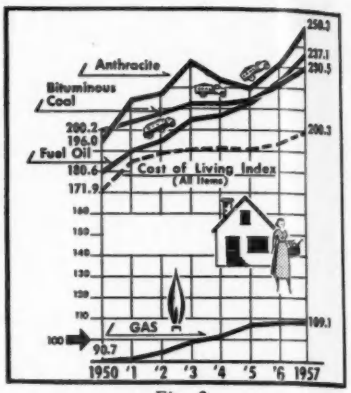


Fig. 2.

passed the point where Canada will be able to use them,' he said.

'Growth of the reserves was stimulated by the original decision of the Alberta Government to allow export from the province. When Westcoast and Trans-Canada Pipe Lines were permitted to export gas, oil companies throughout the West stepped up the search for gas. The result has been the discovery of very large reserves, which now await continuation of development drilling,' Mr. McMahon commented.

'The only way, however, to ensure development drilling is to provide markets for the gas—and this means export,' he emphasised.

'Export in turn will stimulate new discoveries, provide for new industries, and distribute economic benefits to all of Canada.'

Trans-Canada Pipe Lines, Ltd., ownership had a sharp turnover during the past two years. U.S. interests held about 70% of it two years ago, but now Canadians have 73%. The political furor about the initial character of the ownership made clear that it had to be changed if it were to become an operating fact.

The 2,700-mile line has not enjoyed the 'sure thing' characterisation that was attached to almost every American line. High construction costs and market size have caused questions as to its economic feasibility. A high annual load factor is vital with fixed charges such as those attached to this project. But, building load factor by offering 'dump gas' prices to prospective industrial users is not apt to be much of an answer. Pipeline gas has a way of becoming expensive as the miles add up. So, we shall see, what price gas in Montreal?

The undertakings are spending about £71.5 mill. to promote gas for Canadian homes and industries along the eastern stretch of the line.

Consumers Gas Co., Toronto, says it can take 82 mill. cu.ft. per day in the first year of service and 165 mill. cu.ft. in the fifth year. Union Gas Co. of Canada, Ltd., in industrial southwestern Ontario, wants 225 mill. cu.ft. a day in the first year; 516 mill. cu.ft. in the fifth. These companies are now taking gas for their areas from U.S. pipeline connections.

Trans-Canada has stated that the designed capacity of 750 mill. cu.ft. per day must be doubled by 1961.

We wonder how much brave talk there is in a statement by one Trans-Canada executive who is quoted as saying that the line 'doesn't need U.S. export now.' He insists that 'we can sell by 1962 all the gas we've contracted for right here in Canada.'

Growth of petrochemical plants is a factor that might contribute to the accuracy of the contention. Polymer Corp., Ltd., a chemical giant run by the Canadian Government will get butane for butadiene production from Trans-Canada. And Canadian Chemical Co., Ltd., subsidiary of Celanese Corporation of America, will enlarge its Edmonton plant for the production of textile yarns and fibres to use Trans-Canada gas as the raw material. There are many other petrochemical prospects.

With about 900 miles of Trans-Canada construction to be completed, hopefully by October, further export permits hang on the views of the Royal Commission that was appointed by Prime Minister John G. Diefenbaker to suggest 'policies which will best serve the national interest in relation to the export of energy and sources of energy from Canada.'

Canadian pipeline contractors are displeased by the methods Trans-Canada Pipe Lines, Ltd., have used in securing tenders. The President of the Contractors' Association commented that he is 'positive they don't want Canadian contractors on this job.' That followed revelation of the list of 12 contractors on the list of tenders. Eight companies are American, two are Canadian subsidiaries of U.S. companies and two are noted as 'presumably' Canadian.

Northeast of the Calgary city limits, one of Canada's largest gas-producing areas is indicated by a recent strike. Jefferson Lake Sulphur Co., an Oklahoma company, found it while exploring an 80,000-acre farmout from the Mobil Oil Co., the prime holder of the lease. The announcement withheld the usual data on well depth, pressure and volume.

Energy needs in Canada still depend upon sources beyond the Dominion's borders for 37% of the supply, according to the Bureau of Statistics. However, that is well down from the comparable 59.5% in 1948.

Oil Gasification Experiment Fails in N. Ireland

AN unsuccessful experiment in the gasification of oil was described by the Minister of Commerce (Lord Glentoran) in the Northern Ireland House of Commons recently.

He said the Ministry had agreed to bear the cost of the experiment up to an amount of £2,000 which was to be borne by Coleraine Borough Council if the experiment proved successful.

Work on the experiment, which was commenced in mid-April, 1956, aimed at testing oil as an alternative to coal for the production of town gas. At that time the prospect was that gas would become scarce and that coal prices would rise faster than oil prices.

Manager Dies

The first experiment was carried out in mid-July, 1956, but the sudden death of the Coleraine Gas Manager delayed the final testing of the new method.

The direct payments, which had to be made by the Council, were not completed by and recouped to Coleraine Borough Council until the current financial year.

The experiment did not succeed for various technical reasons, and the assumptions about coal shortage and price trends were not realised, so that the attractions of the scheme had decreased. The £2,000, therefore, became a final charge on public funds.

Share Issue

To assist in financing the increase in demands for gas mains and services, and the Company's share in a new Company, Thermal Traders (Vic) Pty., Ltd., the Directors of Colonial Gas Holdings, Ltd., are offering Ordinary stockholders 300,000 Ordinary shares of £1 each at par, in the proportion of one Ordinary share for each £5 Ordinary stock held on January 10, 1958.

COAL SHOULD MAKE REFINED FUELS, SAYS N.C.B. RESEARCH CHIEF

At Stoke Orchard (left to right): Mr. James Carr, Mr. C. H. Chester, Mr. T. L. Tallentire, Dr. D. C. Rhys Jones, Mr. L. P. Ingram (Chief Engineer, S.W.G.B.), and Mr. F. C. Gay (Secretary, South Western Section).

SOUTH Western Section, I.G.E., visited the National Coal Board's Stoke Orchard research establishment recently.

The Chairman of the Section, Mr. T. L. Tallentire, introduced Dr. D. C. Rhys Jones, Deputy Director of the research establishment, who spoke on 'The place for conventional forms of fuel in the future.'

The change to atomic power, said Dr. Rhys Jones, would set free the small and high volatile coal, now being mined, which could be better used as a source of special fuels and, ultimately, of fluid fuels. Coal should now be thought of, not as a material to use in its raw state, but as the starting point to make more refined fuels.

Dr. Rhys Jones replied to questions raised by Dr. A. Marsden, M.B.E., Mr. O. H. W. Boonham, Mr. J. W. Denton, G.M., Mr. J. Foxton, Mr. G. F. Oliver, M.B.E., Mr. P. J. Whitehead, and Mr. F. L. Whitehurst.

General Meeting

Present at the general meeting of the Section was Mr. C. H. Chester, C.B.E., Chairman of the South Western Gas Board.

Gasworks Closes

Gas manufacture ceased on February 9 at Huntingdon gasworks of the Eastern Gas Board, opened in 1856 by the old Huntingdon and Godmanchester Gas and Coke Co., Ltd., to supply gas to the two towns of Huntingdon and Godmanchester.

Objection Sustained

Gainsborough (Lincs.) Urban District Council, having received an objection from the Yorkshire Electricity Board, have decided not to proceed with the installation of gas wash-boilers in 62 houses which they are building on the White's Wood Lane Estate.

From a paper to the London and Southern Section of the I.G.E., February 18.

Civil Engineering Design in the Gas Industry

By D. A. ANDREWS, M.Inst.C.E., M.Inst.Gas E.,
CIVIL ENGINEER, CENTRAL CONSTRUCTION DEPARTMENT,
SOUTH EASTERN GAS BOARD,

BEFORE describing examples of civil engineering work, the causes for the departure from the more conventional and traditional designs should be considered. No new arrangement of the usual structural materials is of any value except, perhaps, æsthetically, if it needs constant care and attention to keep it in good order. The continual rise in wages and the cost of materials makes it impossible to calculate the future cost of necessary repairs and maintenance. So when the engineer is considering methods and materials of construction, it must be his aim to use every means to combine adequate design with low maintenance in the future, for although capital charges for new plant structures and foundations must be kept within reasonable limits, increased first costs bearing annual fixed charges are preferable to ever increasing maintenance charges. But the solution of a problem is not always found by employing more expensive methods and materials. It is often simply at the cost of a little more thought. Such departures from the traditional type structures—structures in the broadest possible sense—have been made at a number of gas works in England and Wales, but perhaps one of the most impressive is the prestressed and reinforced concrete shell roofed retort house at the Garston works of the North Western Gas Board. It is probably the tallest shell roof structure in the British Isles with a springing of the barrels at about 100 ft. above ground level. The shell roof is only 2¾ in. thick. Such departures from tradition as this are made possible, largely, by the advances which have been made in the science of various fields associated with civil engineering. Of these, soil mechanics and concrete practice are the two most important. In foundation work, settlement and the corrosive nature of soils and waters are the two most likely factors to bring about the need for future maintenance unless provided for in the design. Settlement cannot be eliminated, but only controlled within safe limits. Corrosive soils and waters can, of course, be replaced, but it is usually less costly to use foundation materials which are resistant to corrosion.

Safe and Economical

Site investigation can be quite simply made by drilling a number of boreholes across the site. Providing the borings are deep enough and at close enough centres, sufficient information should be obtained. This is recorded on the borehole log sheets, and together with laboratory tests, the results enable safe and economical foundations to be designed. It is particularly important to have an adequate number of drillings made over the sit—at a maximum of 100 ft. centres is suggested—and if notable divergence is found between one borehole and its neighbour, more drillings should then be made until the fault is localised. The total cost of this work is usually well below .01% of the total cost. If it is much higher the site is likely to be unsuitable. How much better to accept such costs than to face the risk of heavy maintenance charges because of the lack of soil investigation? This is a rather specialised subject, and it is advisable to employ a specialist firm to carry out the investigation. The interpretation of test results, however, must be considered with knowledge gained from practical experience, since the results of such a survey will indicate the type of foundation to suit the particular requirement.

Most of the work in the Thames Estuary is concerned with piled foundations, in fact there seems to be few of the works in the South Eastern Gas Board's area which do not require foundation loads to be supported on piles. In the past the load which a pile would carry has generally been estimated by applying one or other of the various dynamic pile driving formulæ to the anticipated set of the pile. For deep beds of sand and gravel the results have been within reasonable limits, but for cohesive soils they have given little indication of the actual static load a pile would carry. The use of the soil investigation report, however, allows a much more realistic value to be applied, particularly in clays. A pile carries its load in two ways, by bearing at the toe or by friction with the soil along its embedded length—either acting separately or together. An example of each way can be demonstrated by two pile tests, one carried out at East Greenwich and the other at the Isle of Grain. At East Greenwich made-up ground, alluvial deposit and peat are to be found above a fairly thick bed of sand and gravel which, in turn, rests upon London clay. At Grain, there is a thick bed of alluvial deposit above a very thin layer of sand and gravel which again overlays London clay.

It is interesting to note that the top layer of alluvial deposit at East Greenwich has compressive strengths varying from 5 to 17.5 lb. per square inch. Fig. 1 shows the load-settlement graph for a Franki pile driven on this site. It is thought that this alluvial deposit supports loads up to about 50 tons without showing appreciable settlement—and could do so for days—and it is only by providing adequate kentledge that the friction between the side of the pile and the clay can be broken to allow the sand and gravel below to be tested. Fig. 2 shows the load-settlement graph for a similar type of pile at the Isle of Grain. It should be mentioned that the results of such tests must make allowance for group action since the bearing capacity of a group of piles may be very much less than the bearing capacity of a single isolated pile multiplied by the number of piles in the group. It will also be appreciated that the settlement of a building depends, among other factors, on the extent of the loaded area beneath the building

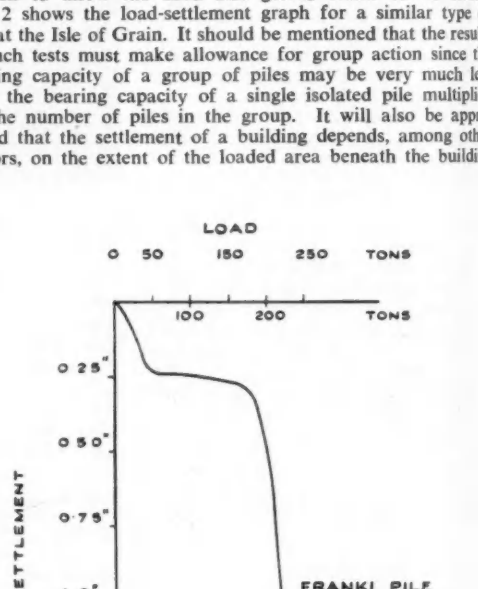


Fig. 1. Load-settlement graph for test piles at East Greenwich.

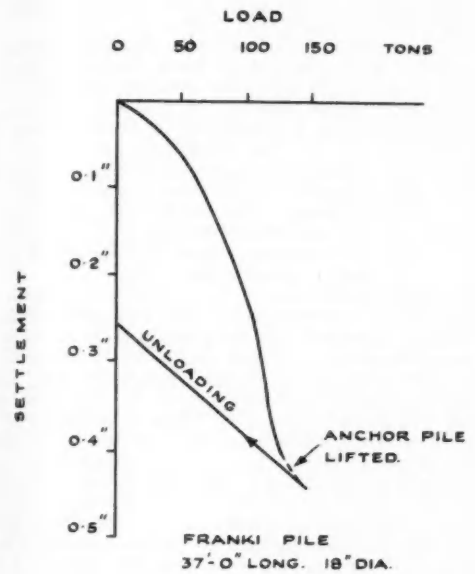


Fig. 2. Load-settlement graph for test piles at the Isle of Grain.

and thus the behaviour of a single pile under test gives no indication whatsoever of the magnitude of possible settlement. The test loading of a single pile, however, is all that is practicable on site, and little value is obtained from tests which do not establish the ultimate load the pile will carry, since it is only by providing this load that confirmation of the laboratory results can be obtained. The method of testing may be of interest. Both piles were jacked down using Freyssinet flat jacks—at East Greenwich against a concrete slab supported by four uplift piles. (The piles in the group are rather close together.) At the Isle of Grain, uplift piles were selected outside the zones of pressure of the test pile. The cost of kentledge at Grain would have been excessive so a 250-ton prestressed concrete beam was held by bridle beams across the uplift piles. The bridle beam and prestressed beam were mobile and were used for four separate tests. It was estimated that the cost of the beam set up would be some £300 cheaper than jacking against a mass of kentledge.

The spalling of concrete and the corrosion of steel reinforcement are likely to remain problems at gasworks despite the measures which are taken to reduce them. The elementary fact remains that on the tension face of reinforced concrete members, hair cracks do develop under working loads with the potential danger that if conditions are right, corrosion will start. Even under the best supervision, one or two reinforcing bars may eventually be displaced or a wire tie will project, and unless these faults are noticed and rectified before the concrete is placed, a source of trouble has been created. Since the war great strides have been made in the techniques of mixing and placing concrete. There is no reason why concrete with strengths from 5,000 to 10,000 lb. per sq. in. cannot be obtained—and maintained throughout the contract. Although it might appear that high concrete stresses could be used in the design, in practice it is not so, since more steel would have to be used.

Prestressed Concrete

To take full advantage of the high strength concrete now possible and at the same time to make the most economical use of steel and concrete, the design of prestressed concrete should now be considered. This has the following advantages; the tensile strength deficiency can be eliminated (no cracks under working loads), higher concrete and steel stresses can be used (2,000 lb. per sq. in. for concrete and 150,000 lb. per sq. in. for steel), and structurally it is satisfactory. The cost however is higher, at between £15 and £25 per ton more than for ordinary reinforced concrete, but it can be slightly reduced if precast prestressed concrete units are adopted where there is a sufficient number of repetitive uses of the form-work. It is not reasonable, however, to make a direct comparison between prestressed concrete and steelwork since the prohibitive cost of successive maintenance paintings of the steelwork would make it non-competitive, except for those structures where no suitable alternative can be found. Where structural steelwork has to be encased in concrete to comply with the fire regulations—a most uneconomical use of steel—it is probable that prestressed concrete would compare very favourably, but no comparisons of prices are available to date.

In the following examples of civil engineering works, there has been a departure from traditional designs although the purposes served by each structure described are quite familiar and generally associated with more conventional designs.

New Dolphins at Wandsworth

The modern tendency in jetty and dolphin design is to avoid the multitude of bracings and struts, within the tide range, between the pile bents which are common in timber and reinforced concrete construction, by adopting an open type structure formed of piles capped with a fairly heavy deck slab. An example can be found in the new dolphins at Wandsworth. Vertical and raking prestressed concrete piles, 16 in. square by 60 ft. long, were driven down into the river bed. The piles were stressed with 60 7-mm. wires and reinforced with $\frac{1}{4}$ in. diameter binders at the head and toe only. A heavy reinforced concrete deck slab was cast on top to tie all the piles together. For fendering, a timber screen was constructed round the front of the dolphin and festooned with heavy rubber tubes of 10 in. diameter and $2\frac{1}{2}$ in. thick walls. Concrete piles were particularly suitable as anaerobic conditions were known to exist in this reach of the Thames during the summer months.

Reinforced concrete chimneys have advantages over their counterparts in brick—foundation costs are less, construction is quicker and insulation of the outer shell is more effective. At the Isle of Grain, to comply with the Alkali Inspector's requirements, a reinforced concrete chimney has been constructed 220 ft. high by 18 ft. in diameter at the base and 9 ft. in diameter at the top. The normal range of flue gas temperatures is around 260°C. but should the waste heat boilers be by-passed—as they might be during lighting-up—temperatures of about 800°C. are possible. To meet these conditions the chimney walls, which average about $5\frac{1}{4}$ in. thick, are protected by a 6 in. thick firebrick lining and an air space of 7 in. average width. To ensure complete ventilation 21 4 in. diameter air vents are provided at approximately 24-ft. centres through the concrete chimney walls. The chimney is 12 sided. This facilitates the use of straight sided timber shutters—curved sides could have been provided in mild steel if required—but to all intents and purposes the appearance of the finished structure is circular. The batter to the chimney walls is provided by slipping out a 6-in. timber every 24 ft. on each straight. The rate of concreting can be as high as one lift of 4 ft. per day. The foundation is piled and consists of three concentric rings of Franki piles. The outer ring is driven to a batter of 1:5 and all piles are capped with a fairly heavy 5 ft. thick reinforced concrete base slab. There is no advantage in prestressing a chimney of this diameter as the concrete under the usual conditions is in compression, but where a small diameter but high chimney is required prestressing will usually provide the most economical solution.

An example of precast prestressed concrete construction is a recently constructed sulphate of ammonia store and bagging house. The whole structure is supported on about 400 bulb-based *in situ* concrete piles which were driven into an 18 ft. layer of sand and gravel lying between 20 and 23 ft. below the surface. The building comprises a store approximately 168 ft. long and 96 ft. wide and a bagging house 108 ft. long by 60 ft. wide. The maximum height of these structures is 66 ft. from top of foundation level. Floors at ground level are continuous and consist of transverse tie beams and slabs with a granolithic finish for the store and a conventional arrangement of pile caps, beams and slabs for the bagging house. The transverse tie beams are arranged at the same pitch as the wall abutments. The store consists of sloping wing reinforced concrete retaining walls about 17 ft. 6 in. high, enclosed by gable ends also of reinforced concrete. A vertical retaining wall and the supporting structure for the pneumatic handling

plant is incorporated in one gable end, and the other forms the end wall of the bagging house. Surmounted on the buttresses of the wing retaining walls are precast three-pinned arches at 8-ft. centres which have a span of 68 ft. 6 in. and a rise of 48 ft. 6 in. The arch ribs are 12 in. wide and have a depth varying from 1 ft. 9 in. to 2 ft. 9 in.; they are approximately 66 ft. long when measured around the curve and are prestressed on the Lee-McCall system with two 1¼ in. diameter Macalloy bars. Each rib weighs approximately 13 tons. To eliminate joints, the arch ribs were formed by precasting the centre section against two factory-made end blocks. For this purpose, a 'whale back' casting bed was prepared to take six soffit shutters with sufficient working space between them. One set of side shutters only was provided. The concrete mix was designed for a compressive strength of 4,500 lb. per sq. in. at 10 days; proportions were 1:1.4:2.8 by weight with a water: cement ratio of 0.38. Sulphate resisting cement and ¾-in. aggregate was used for the mix.

'Entirely Successful'

The length of the ribs necessitated the use of couplers for the Macalloy bars; the main bars were made up of one bar 62 ft. long and one bar 5 ft. ⅞ in. long. To accommodate the larger diameter of the coupler the bottom end block of the rib was cast with a 2½ in. diameter duct. The bars in the *in situ* section of the rib were wrapped with 'Kopex' sheathing as it was not considered practicable to insert the bars and coupler after casting. The rocker-type hinges at the abutments and the 'knife edge' hinges at the apex are made of malleable cast iron. The rocker-type abutment hinge has a 3 in. diameter mild steel spindle; the hinge is completely wrapped with 'Denso' anti-corrosion tape after erection of the rib. To date this coating has proved entirely successful. Corbels are provided in the top end blocks of the ribs to support two precast reinforced concrete crown slabs which are placed 1 in. apart as a means of ensuring the continuance of the crown articulation. By prestressing these slabs to the arch ribs they also provide a permanent tie between ribs before the erection of the roof slabs. The Gifford-Udall-CCL system was used to apply this prestress. Roof covering is provided by 12 in. by 3 in. by 7 ft. 6 in. pre-tensioned slabs which have a 3-in bearing surface on top of the ribs. Projecting links from the ends of the slabs were interlaced with upstand links on the top of the ribs and secured with longitudinal reinforcement. The space between the ends of the slabs was then filled with concrete, the top of the rib forming the soffit shutter. The roof surface was finally waterproofed with a sprayed bitumastic ('Cromastic Lastic') finish, ridges being provided at the articulation. Modern screening, conveying, pre-weighing and sack-sealing machinery is installed in the bagging house to carry the sulphate of ammonia to the loading bays. The store is designed to hold a maximum of 10,000 tons of sulphate of ammonia when trimmed.

Another small example of precast prestressed construction is the Glover tower frame at the same Works. In general the tower was required to be 35 ft. in height with four 12-in. square corner columns at 11 ft. 6-in. centres, the corner columns being braced by horizontal members at approximately 4 ft. 3-in. centres. The sub-structure had already been constructed some years before. The method of construction called for precast concrete portals to be erected opposite each other and then to be capped with another pair at right angles, and so on until the top precast platform level. The vertical legs were stressed at successive stages with Lee-McCall rods, as were the additional precast cross bracings.

Recent estimates have shown that where it is necessary to provide a piled foundation for a mild steel gasholder tank, it is both cheaper in first costs and subsequent maintenance to construct an underground tank. There are two factors which have a considerable bearing on how much can be saved: They are the pile load and the type of crown framing. There are differences of opinion as to what factor of safety should be adopted in assessing the safe working load for a pile. Since this can vary from 1.1 to 3, the number of piles will vary in direct proportion. Uneven settlement should be avoided at all costs and a factor of safety of not less than 2½ should be adopted when considering pile loads for multiple lift holder tanks; so any estimates referred to in this paper have been based on piles with such working loads. (By comparison, for storage tanks the factor of 1.1 is usually adopted.)

Table 1, based on a superimposed load of 1 ton per sq. ft., gives the increased thickness of the concrete mushroom slab of the raft, designed in accordance with C.P. 114, for pile loads of 30, 60 and 90 tons:—

TABLE 1

Pile Load	*Mushroom Slab*	*Slab Thickness*
	Size	
30 tons	5½ ft. square	7½ in.
60 tons	7·75 ft. square	11½ in.
90 tons	9·5 ft. square	15½ in.

These figures show that the increase in cost for the slab for the heavier pile load is very small compared to the cost of the additional pile, so that it does not, in fact, make much difference to the total cost.

The method of supporting the crown of a holder with an underground tank affects the cost quite considerably. The conventional type of trussed crown, that is, one which is attached to the inner lift of the holder, requires a kingpost at the centre varying in depth from 20 to 30 ft., which means that the top of the tank bottom or the dumpling at the centre

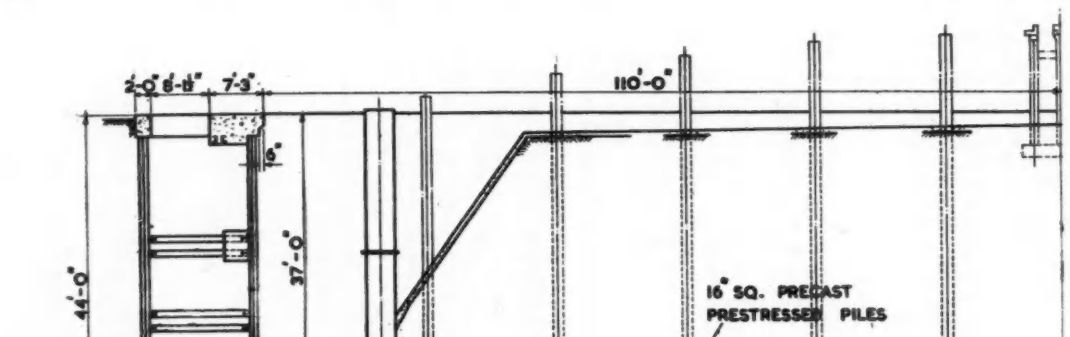


Fig. 3. A sectional drawing of a gasholder below-ground, sheet piled tank showing on the left the two concentric circles of sheet piling and the design of the inlet or outlet gas main through the base of the dumpling. The precast prestressed piles form part of the support for the holder crown.

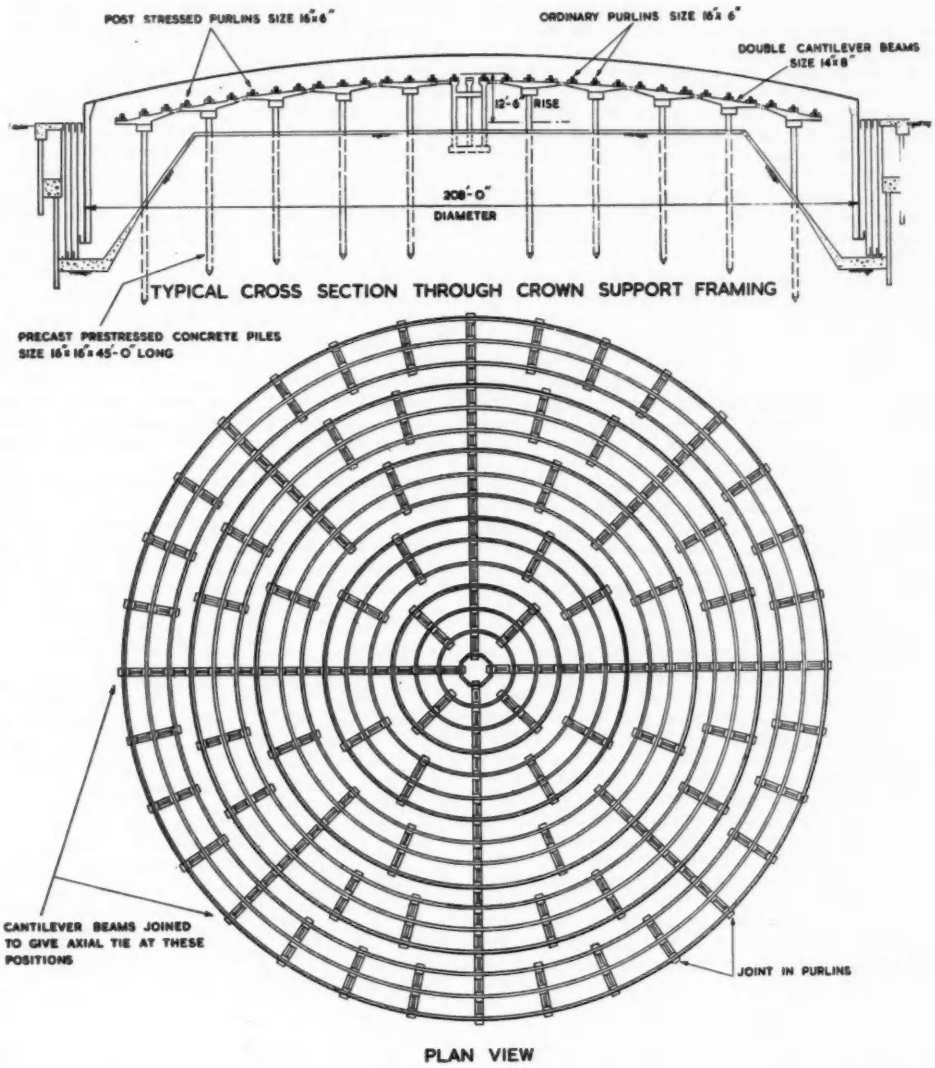

POST STRESSED PURLINS SIZE 16"x6"
ORDINARY PURLINS SIZE 16"x 6"
DOUBLE CANTILEVER BEAMS SIZE 14"x 8"
12'-6" RISE
208'-0" DIAMETER
TYPICAL CROSS SECTION THROUGH CROWN SUPPORT FRAMING
PRECAST PRESTRESSED CONCRETE PILES SIZE 16"x 16"x 45'-0" LONG
CANTILEVER BEAMS JOINED TO GIVE AXIAL TIE AT THESE POSITIONS
JOINT IN PURLINS
PLAN VIEW

Fig. 4. **Above:** *A sectional elevation of the crown supporting frame, showing the position of the lifts when fully deflated, the dumpling and the placing of the piles.* **Below:** *A plan view of the crown supporting frame showing cantilever beams, the post-stressed circular purlins and the arrangements to avoid distor tion of the crown plates if subjected to uneven weight.*

must be at a slightly lower level than this. The cost of the extra excavation from the dumpling to accommodate this form of crown construction can represent nearly a half to one-third of the total cost of the dig necessary and its elimination makes a very substantial saving. A crown support framing, which is constructed on top of the dumpling, can, therefore, be less expensive than the cost of this dig plus the cost of the framework for the trussed crown itself. The design of a holder can be affected by the powers of control given to the Local Planning Authorities under the Town and Country Planning Act, 1947. Permission to erect a holder under this Act can embrace most irksome dimensional restrictions and even upset the precise siting of the holder, but by constructing an underground gasholder tank a considerable increase in storage capacity can be realised if a height limitation is imposed by the Town and Country Planning Authorities. The saving in the quantity of water is another advantage of an underground tank compared with an above ground tank and even more so the saving in maintenance costs if the zinc treatment of the tank water and painting of the tank are included as routine operations. The traditional materials for constructing an underground tank, brick and mass concrete, have gradually been superseded by reinforced concrete and many fine examples exist today of tanks so constructed. In the very broadest possible terms, the cost of the temporary works to construct a reinforced concrete wall in an excavation is practically double the cost of the reinforced wall, so it appears logical that there would be a considerable saving in cost, if the temporary works could be maintained as permanent works and made completely watertight at a cost less than half that of the temporary works.

The estimates for a holder at the board's Kingston works prepared in 1953 showed the cost of a 1½ mill. cu.ft. holder, with a steel tank on piled foundations, as £142,000 (bell £76,000). It was estimated that the cost of a 2½ mill. holder, four lifts with an underground tank, would be £229,000 (bell £109,000). Because of limitations imposed by the Planning Authorities, it was only possible to accommodate a 2.3 mill. holder and the tenders accepted in July, 1955, for this holder totalled approximately £197,000 (bell £122,000). The estimates for a holder at the Wandsworth works, again to the Planning Authorities' requirements, prepared in 1956 showed that the cost of a three lift 3.75 mill. cu.ft. holder in a steel tank on piled foundations, totalled approximately £383,000, and that a four lift 4.9 mill. cu.ft. holder in an underground tank would cost £386,000, of which the cost of the sheet piled tank was £154,000. The tenders accepted in 1957 totalled £376,000, of which £150,000 was for the tank and crown framing. The type

of underground tank considered in these estimates is as shown in Fig. 3 and it is now being constructed at the Kingston and Wandsworth works. Two concentric rings of steel sheet piling are being driven round the site and the outer ring consists of Larssen No. 3 section piles capped with a concrete ring beam. An annulus is then dug to the level of the top of the inner and lower ring of sheet piles, this ring consisting of Larssen No. 4B section piles. A heavy reinforced concrete walling is then cast up to the outer ring and over the top and slightly beyond the inner ring of piles. Excavation then proceeds down to the level of the rest blocks for a reinforced concrete annular slab. The internal edge of the slab was designed to form a retaining wall for the earth fill of the dumpling. The internal interlocks of the steel sheet piles are caulked with cement and asbestos string (philplug) to ensure watertightness. By incorporating suitable junction piles, inlet and outlet pits are provided, formed with full length Larssen No. 4B section piles. The logical sequence to this type of tank is the sheet piled annular tank now being considered for a 2-mill. holder at Gillingham where two concentric full length rings of sheet piling are driven to form a 15 to 17 ft. wide annulus with suitable junction piles to form the inlet and outlet pits. The advantages would appear to be that:—

(a) All the piles are pitched and driven from ground level; (b) there is no need to provide fixity at the toe of the piles and therefore the total length of piles need be little more than the depth of the holder lifts; (c) excavation is generally reduced; (d) quantity of concrete is reduced; (e) the inlet and outlet pits' arrangement is simpler; (f) the supports for the crown framing are simplified.

One of the constructional difficulties with the standard type of crown framing occurs when the seams of the crown sheets lie over or parallel to the purlins or rafters of the crown framing and unless the rivets are carefully held up during riveting, leaks often occur at these places. This arrangement occurs largely because the main bars are radial and the purlins tangential. The difficulty can be reduced if radial members as short as possible are used for supporting circumferential purlins. Fig. 4. The system for supporting the crown for both the Kingston and Wandsworth holders consists of the vertical piles and pier formed around and on the dumpling, on the top of which is bolted a pair of concrete brackets supporting three complete circles of purlins. The purlins are precast and joined with an *in situ* joint over the rafters. Every third ring is to be prestressed circumferentially to ensure the stability of the rings and, in addition, sets of radial ties are provided which tie all the rings to the centre post.

DISCUSSION

Mr. **W. R. Garrett,** Constructional Engineer, Northern Gas Board (Newcastle), said that his first point was to suggest that it did not matter how many boreholes there were on a site; they rarely conveyed a true picture of ground conditions. At best, such data was only a guide and generally the information obtained was one of the finest methods of leading an engineer 'up the garden path.'

The statement on page 3 of the paper concerning a 250 ton prestressed concrete beam appeared to be loose phraseology and he presumed that what was implied was that the four uplift piles are capable of transmitting a load of 250 tons to the pile under test. To use a prestressed beam for such a purpose appeared to be an expensive method of doing the job and if the more orthodox steel beams had been used at least some scrap value would have been obtained from the beams on completion of the tests.

He was in favour of prestressed concrete whenever a saving was indicated—after all it was sound commonsense to prestress concrete under certain circumstances. Unfortunately in the North the aggregates were generally poor and inconsistent in quality and in a large job the variation in source of aggregate made accurate grading impossible. He was also convinced that lack of freshness in the cement produces difficulties in obtaining high cube strengths at seven days and while at three months the results might be satisfactory these long delayed checks were not of great value when carrying out prestressed concrete work.

The reinforced concrete chimney described and illustrated in the paper indicated an average air space of 7 in. and he would like to know why this gap was so large. He asked whether Mr. Andrews would confirm that the 4 in. diameter ventilation holes were through the corbels supporting the firebrick lining, and what steps had been taken to protect the concrete slab from heat—the drawing appeared to indicate that the hot flue gases were in contact with the base concrete.

He continued: 'I certainly like the design for the P.V.C. chimney stack but gather that this is only a suggested design.

'Some of the cost figures given in the paper for gasholder tank construction are not those that I would expect and are contrary to my experience but time will not permit detailed observations on them. However, I am disturbed at the obvious high cost of the crown supporting structure illustrated for Wandsworth. Since the last war, of the dozen or so holders that we have built in the North, only one has been built in a new underground tank and this has a reinforced concrete crown supporting structure but the cost of it would be considerably less than that proposed by Mr. Andrews. Has Mr. Andrews made a mistake in giving the size of the members as 16 in. by 16 in.? I am all in favour of using pre-cast concrete units but not bolted connections as proposed on the drawings. It should be realised that the crown supporting structure has after all only to support a dead weight of some 5 to 7½ lb. per sq. ft. together with the superimposed weight of a few men and possibly a 5 lb. per sq. ft. snow load if one wishes to be ultra careful, and this loading will only occur during construction and at subsequent intervals when the holder is out of commission. Surely such loading does not require piles about 40 ft. long driven through a 15 ft. layer of ballast.'

Such Conditions Rare

'Providing the ground conditions are suitable there are no real objections to steel sheet piling for gasholder tanks but generally such conditions are extremely rare. The ideal conditions are obviously where good sound clay exists and immediately one deviates from such conditions then trouble and extra costs are involved. Even sandstone boulders in the clay are permissible because steel piling will in general split them, but should these be whinstone then the financial success of the final project becomes doubtful. On the borehole indicated for the Wandsworth gasholder I hope everything will go according to plan. Personally I would have preferred the outer row of sheet piling to have penetrated and sealed the sand and gravel layer which I assume will be water bearing. If this is not sealed severe difficulties may be encountered before the inner row of piles can be driven. Again, to drive a No. 3 Larssen pile through 15 ft. of sand and gravel indicates rather severe punishment to the piles and it is quite possible that they will distort and jump the clutch.'

'I do not think that corrosion of the piles will be severe although it should not be overlooked that if any, it will be (apart from the wind and water line) where deposits collect in the tank and that at these places the stress in the piles is greatest. Mr. Andrews has not indicated what paint treatment if any has been specified for the piles and I feel that it would be of interest to the meeting to know whether he has considered cathodic protection of the steel tank.'

'Why in the Wandsworth holder are prestressing cables being used under the carriage base plates? This to my mind is an unjustifiable extra expense which could have been avoided by the use of ordinary reinforcing rods.'

Replying to Mr. Garrett, **Mr. Andrews** said that the estimated saving in cost in pile driving tests at the Isle of Grain amounted to £300, which was entirely due to being able to avoid using great weights of kentledge. Referring to the aggregate available in the North of England, he said that fine crushed rock could be made use of there as good quality aggregate, comparable to the gravels in the South. It was costly to transport this to Grain.

He admitted that the gap in the chimney was abnormally large. As regards the floor of the chimney, this was protected by a firebrick lining.

Referring to the difficulties Mr. Garrett had forecast in the driving of the Larssen sheet piles, he pointed out that they had run into none of these difficulties because of the efficiency of the Delmag hammer with which all the driving of this type of pile had been done. He pointed out that the stresses on the gasholder tank had only occurred during construction, and they had been counteracted by the weight of the water when

the tank was filled. Up till now cathodic protection of the sheet piles had not been considered. It might be tried later on.

Mr. W. T. J. Gedge, Eastern Gas Board, said that he had for some time past considered that the South Eastern Gas Board had had to have courage to be in the forefront in adopting new techniques in civil engineering. Mr. Andrews had been an advocate for prestressed concrete since this method of construction had been introduced into this country some seven years ago.

He fully agreed that in reinforced concrete full advantage of high strength concrete, so easily obtained by controlled concrete mixing, could not be taken, and that the answer was prestressed concrete.

He was somewhat puzzled by the information given on page 4 of the paper which related to costs. The second paragraph seemed to say that prestressed concrete was between £15 and £25 per ton more than the cost for ordinary reinforced concrete. It was most unusual to give concrete costs in rates per ton. The figures of £15 and £25 were approximately the difference between the cost of mild steel bars used in reinforcd concrete and high tensile steel used for prestressed concrete. Surely it would have depended on the job which type of construction had been the cheaper. Any structure of long length, where its own weight was a major factor, was undoubtedly cheaper in prestressed concrete, and probably the reverse was true in a compact structure.

Prestressed concrete conveyor gantries at Willoughby Lane with spans of 90 ft. and more were an example where prestressed concrete had been the only alternative to steel, since the cost of constructing the gantries in reinforced concrete would have been out of the question. These gantries had been constructed four to five years ago, and at that time the cost had been about 10% more than that for a steel design. Since then it was fair to say that steel costs had risen more than prestressed concrete costs. These gantries had proved to be the cheaper type of construction since no maintenance costs had been incurred; if they had been built of steel there would have been heavy painting charges.

More Fine Cracks

The question of the spalling of concrete was timely. He had found that twisted steel was being pushed for reinforced concrete with the idea that higher steel stresses could be used. Higher steel stress would result in higher tensile stress in the concrete surrounding the steel with the result that there would be more fine cracks. It was claimed that the twisted steel had a better bond with the concrete and that the cracks were more numerous but not larger. He would like to have Mr. Andrews opinion on the use of twisted steel. He personally had stated that it was a waste of money to pay the extra price for twisted reinforcing steel for gasworks structures.

He went on: 'There is another reason for the spalling of the concrete surface and that is caused by freezing if the concrete is pervious to water. Air entrained concrete makes the concrete impervious and gives a high degree of protection from the effects of freezing. For some four years past all reinforced concrete carried out for the Tottenham Division of the Eastern Gas Board is air entrained and the usual crazing of the surface has not taken place. Air entrainment also acts as a lubricant when mixing and results in a lower water to cement ratio for the same workability. For this reason only air entrained concrete has a higher crushing stress than normal site concrete.'

'Mr. Andrews makes a brief reference to the framing for supporting the P.V.C. flue pipe 220 ft. high. We also have had to discharge exit gases from a chamber acid plant 210 ft. above ground level. We, too, have used a P.V.C. tube, but in our case we have constructed a reinforced concrete chimney shaft in which the tube is centrally supported. The cost of the shaft including foundations was £9,000, and it would be interesting if Mr. Andrews would let me know the cost of the prestressed concrete open framed stack. I would also like to know if any special precautions were taken in considering the Glover tower framework to resist the atmosphere of the acid plant, which seems to be unkind to both steel and concrete.'

In reply to Mr. Gedge, **Mr. Andrews** said he agreed about the use of precast concrete. In fact it was seldom used. He also pointed out that the slope of the holder dumpling had been changed to cheapen its construction. Referring to the differences in cost between reinforced and prestressed concrete, he said that the price quoted was that of the ordinary reinforced concrete, and that the extra cost was due to greater cost of reinforcement and tensioning. High tensile steel bars gave less creep and fewer cracks.

He thought that concrete admixtures with a strength of 4,500 lb. were quite adequate, but he pointed out that he always insisted that the men, who put the concrete, should thoroughly work it.

Mr. A. F. Grant (London) proposed a vote of thanks.

Epoxide Resins

AS more and more steel is used in constructional work of all kinds, so does the need for its protection against atmospheric corrosion increase. This has had the effect of a great deal of research being carried out into finding new protective coatings for steel plant and structures which are subject to a specially corrosive as well as a normal atmospheric exposure. With the increase of basic raw materials made available by the distillation of crude oil in Great Britain, it has become possible to extend the number of synthetic products of all kinds which can be used for protective coverings. One such product is the 'Epikote' resin based coatings on the market.

These contain members of the epoxide group of synthetic resins which were originally discovered a number of years ago in Germany, but have only been developed since 1947. They are straight chained polymers terminated at each end by an epoxy group and usually possess hydroxy groups spaced regularly along the chain. They can be made by the reaction between epichlorhydrin and a dihydric phenol in alkaline solution at 100°C. A series of synthetic epoxy resins have been made by the Shell Chemical Corporation and Shell Chemical Co., Ltd., by the reaction of epichlorhydrin and diphenylol propane, both derived from petroleum, under various conditions and at various ratios of reactants. Members of this series vary widely in molecular weight.

The solid grades of these resins, mainly used for surface coatings, are combined with other materials such as fatty acids, amino resins, phenolic resins or amines to form the grade of coating needed for the particular application. The main advantage of the epoxy resin based coatings is that they possess adhesion, flexibility, toughness, and a resistance to chemicals which has been quite impossible to obtain until now in one finish, in fact they appear to combine most if not all the advantages and special properties of many different finishes previously used for metallic surface protection in one finish.

Given the conditions under which the particular finish is needed to resist corrosion or in what form it should be applied, a suitable paint cement or stoved finish can be produced.

Testing Tar

A FOURTH edition of *Standard Methods for Testing Tar and its Products* has been published. It is seven years since the third edition appeared and during that time the panels responsible for each section of the book have been engaged upon an extensive laboratory programme to test and improve the existing methods and to evolve and standardise new methods and techniques.

Each test has been carefully scrutinised and some have been completely rewritten; amendments have been made throughout the book. There are ten tests which appear for the first time and three former tentative methods have been adopted as standard methods. A new section deals with accuracy and precision and the precision of many of the methods has been established from the results of co-operative tests in at least eight different laboratories. The appendices have been revised and brought up to date. The lay-out of the book has been improved and a comprehensive index is included. *Standard Methods for Testing Tar and its Products* is written by chemists actually engaged in this field. It is the only comprehensive reference book on the subject and is internationally recognised.

From a paper to the East of Scotland Junior Gas Association, February 8, 1958

The 'Bulge'—and the Responsibility for Training

By R. J. FAULKNER,

EDUCATION AND TRAINING OFFICER, SCOTTISH GAS BOARD.

THE question of recruiting boys is going to take an interesting turn over the next few years. As a result of the increased birth rate between 1946 and 1949, the number of boys who reach 15 years of age from 1961 to 1964 will be substantially increased. During the years 1961 to 1964 plus, many industries will take the opportunity to recruit at a higher rate than normal in order to provide for the future when the numbers leaving school will drop again. Also, industries may be able to become more selective. But, just as the resources of the educationalists, as the 'bulge' passes through the schools, are being sorely tried so will the training facilities of industry be taxed in the not too distant future. This is no small problem. An investigation by the National Institute of Industrial Psychology brings out some disturbing facts. A review of the studies of 2,000 engineering craft apprentices revealed that 63% did not reach Ordinary National Certificate or Final City and Guilds of London Institute level. While we look forward to the findings of the Carr Committee, which is expected to report soon following their investigation into apprenticeships generally, it may well be that our training is suspect. Nor is this the only problem with craft apprentices. There are many people who, like myself, feel that a craft apprentice's training and indeed the training of student engineers, especially in the earlier years of their careers, should be a good deal broader than at present. Increased mechanisation, automation, electronic controls, and similar technical developments are altering the pattern of industry fairly rapidly. What is required of many employees in 20, 30, or 40 years' time, perhaps sooner, may be somewhat different to that for which they have been trained. Is there not a case, then, for a wider type of initial training—a training in fundamental engineering, in order to make any subsequent change of job or work pattern less of a problem in the future?

If you concede this point or if you think that industry's existing craft training is open to criticism, we face the question, what can be done about it and by whom?

I would submit that our Continental friends are away ahead of us in this respect. France, for example, has many institutions which train craftsmen on a full-time basis and, on completion of their training, the young men go straight into industry as improvers or journeymen. The general trend in Germany is to resist using any but master technicians to train apprentices. Switzerland and Sweden also have full-time training for apprentices up to and beyond 18. In Switzerland many industries will not employ craftsmen unless they hold the qualification obtained from the full-time training establishments, and, as an encouragement to such institutions, many industries contract work out to them in order to provide a wide range of industrial experience for students.

Greater Part for Industry

The general idea of attaching an apprentice craftsman or a student engineer to a craftsman or engineer must surely cease to be the main means of 'training'—but what do we put in its place?

The intention of the 1944 Education Act to introduce county colleges to continue general education and introduce vocational studies beyond the age of 15 is still a dream. Universities and the recently designated 'colleges of advanced technology' are being extended to take care of the more able student, but what of the rest? It seems obvious that industry itself will have to play a greater part and shoulder more responsibility for training.

We have been considering the problem of engineering training in the gas industry for some months in Scotland, and many discussions have taken place in divisions and at colleges. It seems to me that we have never been able to attract those boys holding the Scottish Leaving Certificate with Highers in the subjects we would like. The reason for this, I would submit, is that boys of such a standard can gain direct entry to many of Scotland's universities and technical colleges, and, with a local authority education grant, study full-time for a recognised engineering or science qualification. The gas industry's offer of evening study, with day release in some cases, is certainly not attracting such boys, though they would probably be successful even by this limited means of study. As a consequence, we have tended in many cases to take boys of a lower standard and they in turn have found the going hard, if not too hard.

Therefore, we are looking into the possibility of linking our gas engineering training with an associateship course in civil engineering. This will enable boys to receive a sound fundamental knowledge of one of the main branches of technology. The course under consideration will cover four years; full-time study in the first year and in the second, third, and fourth years the time will be spent equally in college and in the gas industry. Entry to such a course would be the normal entry standard required by the college, Scottish Leaving Certificate with selected subjects, or a good Ordinary National Certificate in mechanical engineering. The fact that boys able to reach the entry standard will be able to obtain a sound technical professional qualification and earn a salary at the same time should certainly attract boys who would normally have had to depend on a local authority education grant.

Appreciation—then Specialisation

The practical training provided by the gas industry will be linked up with the boy's studies and during his early years he will be expected to gain an appreciation of all the Board's engineering activities before deciding where to specialise in the industry. After the 'appreciation stage,' the industry must have some say in the specialisation which will follow and this, to a certain extent, will depend on the Board's requirements.

The scheme will be open not only to newly-recruited boys, but also to young men already in the industry who can reach a good standard in their Ordinary National Certificate studies. I personally would not debar apprentices, whatever their craft, from entry to the major course if they can reach the standard necessary for entry. Final details have still to be determined and presented to the Board, but I would like to see the first group of students commencing in October of this year.

While a programme of training will be drawn up for these engineering trainees and similar programmes will be arranged for craft apprentices as further schemes are developed, the responsibility for ensuring that boys follow such a programme under the right kind of supervision can never be one department or one man's responsibility. To my mind, it is job of work of the utmost importance and each and everyone employed in the gas industry must help to ensure that the training given is the best that can possibly be devised.

It is not sufficient to read the programme of training, and, finding that an engineering trainee is required to spend three months in the mechanical workshops, or an apprentice six months in the appliance repair shop, to attach him to the department and leave him to find out for himself. It is imperative that as much prior organisation of a boy's training programme as possible shall be carried out, plotting the detailed work he shall do, ensuring he knows what is expected of him, and detailing those who will be responsible for him and help with guidance. Every minute should be used effectively to ensure that a sound knowledge not only of the work of a department, and of the relationship of one job with another, is gained, but also that the boys learn how to undertake the work they will be expected to do.

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Trade News

Ransomes Produce the NR 20 High Efficiency Forklift

THE increasing trend to lay down governing standards and tests has done much to promote higher degrees of safety, reliability and efficiency in present-day industrial products. The buyer of equipment conforming to such standards can be sure of the maximum safeguard, for the finest brains available will invariably have pooled their resources to devise the qualifying standards.

Such has recently been the case in the forklift truck world. As a result of many years of detailed research, a series of fou tests for the stability of fork lift trucks has recently been published. Designed to ensure an adequate safety margin under normal conditions, these tests fully recognise the need for all-round stability, by tilting the vehicle quite steeply on both fore-and-aft and lateral planes. In fact the severest working conditions are actually reproduced.

Ransomes Sims and Jefferies have welcomed the tests, and with their full value in mind are producing a new range of forklifts, based on their famous 'FL' series. The latest of these, the NR 20, a development of the FL 2000, is about to enter the market. Rigidly conforming to the new international standards, it represents a goods-handling service of high efficiency and economy, and its safety is proved to the satisfaction of industry at large.

No Fault Found

It should be emphasised in passing that in testing the former FL series of trucks Ransomes could find no fault with either lateral or longitudinal stability. In fact, a tendency towards too high a safety margin was revealed, which could lead to the operator unknowingly overloading his machine and causing structural damage over a period of time. This information proved invaluable in the designing of the new NR range.

A battery-powered forklift truck, the NR 20, will transport and stack loads of up to 2,000 lb. at a load centre of 24 in., and up to 20 cwt. (2,240 lb.) at 20 in. The standard freelift is 4 in. and the lift can vary as required from 96 in. to 168 in. Particular attention has been paid to operator convenience, and all controls are simple and near at hand. Both foot and hand brakes are provided, incorporating internal expanding brake shoes. Steering is through a totally enclosed Marles oil-bath steering box operating on the rear wheels.

Both pump and driving motors are built in the light of Ransomes' forty years' experience in electrical traction, and are generously rated to withstand the high overload capacity necessary for arduous truck duty. The standard model has a top laden speed of 5.5 m.p.h., but the vehicle can be supplied on request with a 4 m.p.h. maximum speed.

In order to meet the ever-widening needs of forklift operators there is a host of attachments available for the NR 20, enabling it to cope with a wide variety of duties. Among these are the operator's overhead guard, load backrest, load clamp, rotary forks, fork extensions, crane attachment, Bickerstaff brick forks and pipe lifters.

Also available are a ram for loads with a centre opening, a swarf handling hopper, bin attachment, load stabiliser, rotating paper roll clamp, and a side shift to facilitate close manœuvring. A new feature of real practical value is the inclusion of a check valve to prevent the too rapid descent of heavy breakable loads (while still allowing the forks to fall rapidly when unladen).

While the NR 20 is an early witness of the value of setting up standards throughout an industry, it is still the rule at Ransomes that every truck completed undergoes thorough individual checking. —*Ransomes Sims & Jefferies, Ltd., Orwell Works, Ipswich.*

NEW ELECTRONIC CONTROL SYSTEM BY ELECTROFLO

A NEW electronic control system for high capacity unit system power plants, which is a development of the Company's long-established pneumatic and hydraulic systems, is described in Leaflet No. S.848 issued by Electroflo Meters Co., Ltd., under the title Electroflo-Smoot Electronic Boiler Control.

Publication No. S.849, issued by this Company, a member of the Elliott-Automation Group, describes the application of automatic boiler control to shell-type (including 'Lancashire') boilers providing continuous, simultaneous control of all the controllable quantities with consistent high efficiency.

Publication No. 1700/S1, Temperature Measurement and Control, outlines the Company's range of pyrometers for industrial processes. Reference is made particularly to the unique galvanometer movement weighing only 2 grammes, and to the Company's complete range of measuring elements.—*Electroflo Meters Co., Ltd., Abbey Road, Park Royal, London, N.W.10.*

ELECTRICITY IN INDUSTRY

THE fourteenth issue of *Electricity in Industry*—technical review of the Lancashire Dynamo Group of Companies—has just been published. It contains four main articles.

The latter article is one of a series which, in this issue, covers methods of use and processing of high-grade transformer core steel.—*Lancashire Dynamo Holdings Ltd., St. Stephen's House, Victoria Embankment, S.W.1.*

Torque Converter now Offered on Weatherill Hydraulic Shovels

THE Weatherill hydraulic mobile loading shovel range has been extended by torque converter transmission as an alternative to the normal clutch gearbox on the majority of the company's models. F. E. Weatherill, Ltd., have the exclusive rights for some months ahead to fit the Brockhouse torque converter to their loading shovels.

One of the outstanding advantages of a torque converter over normal transmission is that it permits faster and more efficient loading at a lower cost per ton of material handled. Moreover, this can be achieved with reduced driver fatigue, for gear-changing is completely eliminated, the forward and backward motion of the machine being controlled by a small finger-light lever.

Basically, this fluid transmission provides within a certain speed range an infinitely variable gear which automatically adjusts itself to load requirements. So far as the actual shovelling action is concerned, the availability of increased torque greatly improves the penetrating power, minimises stalling of the engine, and reduces any risk of damaging the transmission and final drive. This improved penetration, combined with the scoop crowding action normally available on 'Weatherill hydraulic' loading shovels enables much more effective loading.

A high starting torque is also a feature of the torque converter and this is conducive to smooth take up of the drive and quick acceleration. Shock loads to the engine are prevented, due to the cushioning effect of the fluid drive. Two forward speeds and one reverse are provided. Maintenance of the oil level is the only attention that need normally be given to the unit.

This torque converter, British designed and built, has been developed over a number of years, having been thoroughly tried in many applications.—*F. E. Weatherill, Ltd., Welwyn Garden City, Herts.*

Ether Ltd. Introduce Four New Instruments

ETHER, LTD., have added to their range of instruments a new temperature recorder capable of dealing with any number of independent temperature points from one to six, and having many refinements. This recorder incorporates a conventional galvanometer, a chart and chart-drive mechanism, recording mechanism, automatic ribbon-mechanism, and an automatic station selector and indicator.

The recording chart has a calibrated width of 6 in. At a speed of 1 in. per hour, it runs continuously for 30 days and it will also run at speeds of ½ in. or 2 in. per hour, if desired. The chart is fed over frontal nylon drive wheels powered by a synchronous electric motor of 220/250 volts which also drives the recording mechanism. Easy loading is ensured by the presence of a hinged-front top-plate which pulls down and gives access to the chart roll.

A lightweight 'chopper-bar,' with calibrated scale attached, is fitted above a knife - edged galvanometer - pointer. Through the action of a timing cam and gear-train, the 'chopper-bar' strikes the pointer at given intervals and imprints a small, coloured dot through the ribbon on to the recording-chart. The knife-edged pointer is attached to the galvanometer coil by means of a flexible metallic strip which reduces the disturbance and load to the precision-ground pivots at the impact of the 'chopper-bar.'

The galvanometer is fitted with an Alcomax 11 magnet, a high-resistance coil, precision-ground hardened pivots and spring-loaded polished sapphire jewels, all of which help to ensure an accurate performance even under severe operating conditions.

No Variation

A completely new scanner-commutator with high-grade nickel-silver contacts is another interesting feature. This commutator has been tested under severe conditions and shows no variation in contact-resistance after 5 mill. revolutions. In fact, only after 10 mill. revolutions is servicing necessary.

The light-alloy chassis, upon which the recorder assembly and galvanometer are mounted, is hinged and can be swung out from the main case. This will obviously permit easy inspection and servicing.

The Ether recorder, which is housed in a welded-steel case, weighs 42 lb. It can be wall or panel-mounted.

Ether, Ltd., have also introduced a new temperature-controller, the Thermal-trol Type 750. This instrument, which employs no galvanometer, has an extremely wide range, being able to control temperatures between −328°F. and +1,832°F. (−200°C. and +1,000°C.) for electrical, steam, gas or oil-fired apparatus, with considerable accuracy and speed.

The temperature-sensitive element in this controller is a platinum-wire resistance, or thermo-bulb, in which the resistance changes in proportion to its temperature, thus causing an unbalanced condition in the a.c. bridge-circuit. A relay opens or closes an electrical circuit, depending on the phase angle of the input voltage to the amplifier. This system is independent of amplifier-gain and is extremely stable.

The control-circuit is of a simple design which uses a minimum number of components and should ensure trouble-free, continuous operation. The Ether Thermal-trol has a 7-in. indicating scale. The instrument is not affected by vibration or ambient temperature. It is suitable for wall or panel-mounting.

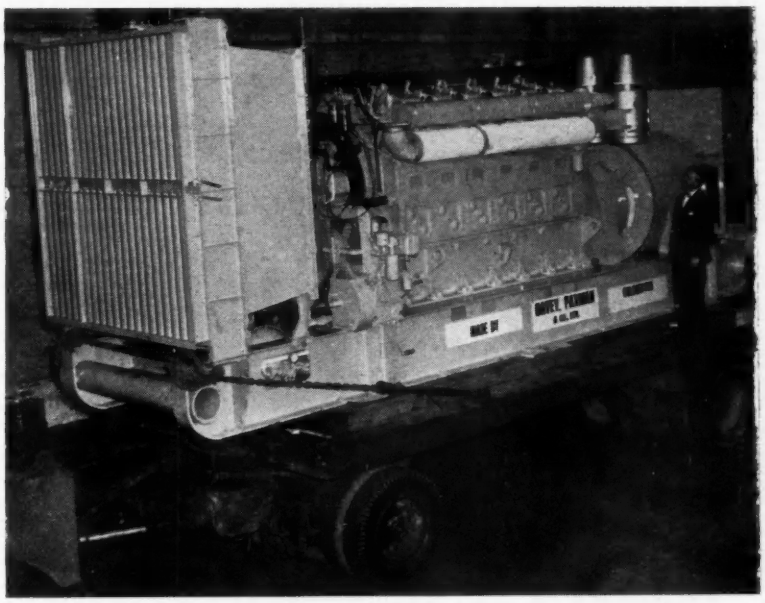
Two new flame-failure controllers from Ether, Ltd., which are entirely new in design, are designed to combat running flame failure in gas or oil-fired systems. The first, the Type 700, is semi-automatic and the second, the Type 701, is a fully-automatic relight unit.

Perhaps the most revolutionary feature of these controllers is their method of 'seeing' the flame in furnaces. Instead of using sensing electrodes, the controllers employ an infra-red-sensitive photo-cell (protectively housed and fitted with a toughened glass lens). The photo-cell reacts instantly to flame failure and when this occurs an electronic control unit immediately shuts off the fuel supply. It is interesting to see that the design of the electronic circuit is such that the controllers are sensitive to flame only and completely ignore radiation within the heating chamber.

The Type 700 unit is designed for manual, electrical ignition of gas or oil-fired furnaces and has provision for an automatic purge cycle. The rather more ambitious Type 701 unit is designed for the completely automatic operation of almost all types of gas or oil-fired furnaces.

It has an automatic purge and ignition cycle thus ensuring that should flame failure occur both pilot burner and main burner are shut off instantly and, after the purging cycle, are automatically relighted.—*Ether, Ltd., Tyburn Road, Birmingham, 24.*

Paxman YL Engines on Oilfields



DAVY PAXMAN & CO., LTD., of Colchester, now offer their 9¾ in. bore by 10½ in. stroke YL diesel engine in Drilpak form. A recent order called for eight SYLC diesel electric units for off-shore drilling operations. These engines, each developing 900 BHP at 850 r.p.m. will be coupled to two 500 kW. D.C. generators, mounted in tandem. Power from these sets will drive a National 130 draw-works two G1,000 and one G700 slush pumps.

For oilfield duties other than drilling, four 12-cylinder pressure charged engines have recently been delivered to the Arabian American Oil Co. Two of these coupled to 500 KW Alternators were delivered to provide power for a recently completed oil camp.

A third 12YLX was delivered as a skid mounted pump. This is engaged in water injection to the formation to increase the flow of oil at the wells. A fourth set, incorporating a normally aspirated engine is a 400 kW outfit specially equipped for work in the open under adverse climatic conditions including sand-storms.—*Davey Paxman & Co., Ltd., Standard Ironworks, Colchester, England.*

PARCOLENE HELPS FIGHT AGAINST CORROSION ON BONDERISED PARTS

PARCOLENE No. 1 is formulated for use as a final rinse either by spray or immersion to increase the corrosion resistance of Bonderised and Parkerised surfaces. So called 'chromate' rinses consisting of very dilute chromic acid solutions have been recommended for many years as the final rinse. Extensive production and laboratory tests have shown, however, that additional advantages can be obtained by using a Parcolene No. 1 conditioning rinse—increased corrosion resistance; yellow stains resulting from the use of straight chromic acid as a final rinse reduced to a minimum; possible deleterious effects of hardness and other soluble salts more satisfactorily countered; and easier make-up of rinsing solution.

Where two or more water rinses are used after Bonderising or Parkerising, Parcolene No. 1 solution should be used in the final rinse. This normally does not have a constant overflow to waste. Parcolene No. 1 solution meets the requirements of Defence Specification DEF-29 for the preparation of a 'chromic' rinse.

In use the tank, which together with the heating coils may be made of mild steel, is filled with water and 4 oz. (0.135 pint) of the Parcolene No. 1 solution added for each 100 gal. of solution. The solutions are then mixed and heated to operating temperature. The Parcolene No. 1 rinse is applied by spray or immersion usually for 30-60 seconds to the Bonderised or Parkerised metal, wet from the water rinse. The rinse may be operated from room temperature to 160°F. High temperatures generally aid in drying the work and the most suitable temperature for each plant will normally be determined by the Pyrene engineer at the time of starting up.

Optimum results are obtained when the Parcolene No. 1 rinse is made up using pure steam distillate or water from a de-ioniser.

This is not normally applicable when 'mains' water is employed and the rinse must be discarded at regular intervals. The frequency depends upon the volume of production. This may be as high as once per shift, but must be at least once per week. Advice on the frequency of discarding will be given by the Pyrene engineer.

Parcolene No. 1 solution is supplied in minimum packings of 100 lb. carboys at 2s. per lb. net ex works. (This price is subject to amendment).—*The Pyrene Co. Ltd., Metal Finishing Division, Great West Road, Brentford, Middlesex.*

BESTOBELL GLOBE VALVES

BELL'S ASBESTOS AND ENGINEERING, LTD., have published a new brochure, *Bestobell Globe Valves*, one of a series describing the Bestobell range of valves. The design of the fittings, the materials used and the quality of workmanship are of the highest standard.

Bestobell valves have proved themselves over many years both in the United Kingdom and overseas and are stocked and serviced by the Company's branches and agents throughout the world.—*Bell's Asbestos and Engineering, Ltd., Bestobell Works, Slough, Bucks.*

NEW VISCO WATER COOLERS BROCHURE

THE VISCO ENGINEERING CO., LTD., have published a new brochure, No. 579, entitled *Visco Water Coolers*, which supersedes publication No. 514 published in 1951.

The text has been re-arranged and slightly modified; a number of new illustrations have been included to show the application of these coolers to many different industries; and tables of typical capacities and dimensions are now included.—*The Visco Engineering Co., Ltd., Stafford Road, Croydon.*

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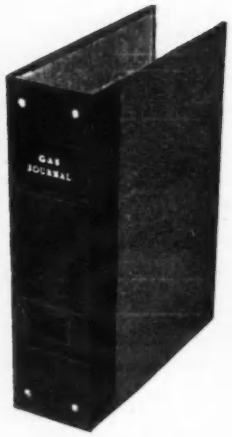

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